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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXI No. 3120.] LONDON, FEBRUARY 28, 1923. [75TH YEAR PRICE 1s.

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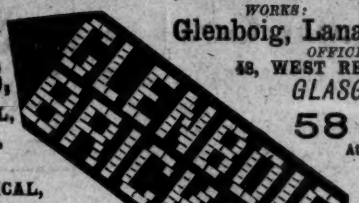

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VOL. CLXI., No. 3120.] WEDNESDAY, FEBRUARY 28, 1923. [75TH YEAR.

EDITORIAL NOTES.

The Sixty and Forty Per Cent. Coal Delivery.

WE have received from the Mining Association of Great Britain a curiously one-sided document. The most pronounced feature of it is that its authors show an excellent consideration for their own convenience, and a striking disregard for the convenience and working costs of such good customers as are to them the gas undertakings of the country. The document states that there is reason to believe that gas undertakings are seeking to effect certain changes in their buying policy in respect of contracts for the forthcoming twelve months. As a matter of fact, it is not a "change" that is in question, but merely a reversion from an expedient condition which has obtained owing to the abnormal conditions prevalent in the coal industry during recent years, to something that was a custom over many years, and a custom duly complied with by the collieries. The condition which force of circumstances compelled or rendered prudent was the delivery of coal in "regular" monthly quantities, with the deliveries constantly asserting the hollowness of the claim to "regularity." The inconstant condition was largely due to the collieries causing diversions when attractive business could be effected elsewhere. Through the irregularity, gas undertakings were much embarrassed, and costs were increased. The Mining Association regards the "regular" monthly delivery as an admirable institution. The gas undertakings do not. Instead of being grateful to the latter for having done what they could to meet during recent years the abnormal circumstances of the coal industry, the colliery owners, now that things are getting more normal, want to perpetuate a condition that to them, they admit, has been an admirable one, and not to revert to the old proportions of 60 p.ct. delivery during the six winter months, and 40 p.ct. during the remaining months. They say that gas undertakings, on the advice of that influential body, the Gas Managers' Association, are now contemplating a reversion to this practice, by the insertion of a new clause in their next contracts. We should be glad if the Mining Association would say precisely to which organization they refer, as there is not one with the title of the "Gas Managers' Association;" and, so far as we know, this matter of coal delivery proportions has not been under the consideration of the National Gas Council or of the Institution of Gas Engineers. It is essentially a matter for each undertaking to settle, in view of the dissimilarity of conditions.

As already pointed out, there is nothing novel about the 60 p.ct. and 40 p.ct. proportions; so that a clause providing for them cannot be called a new one. Moreover, during the time that this condition was the custom, there was no serious complaint regarding it. But now the colliery owners state that they view the reversion to it with some anxiety; and they speak about its militating against the efficient and economic working of the collieries. There is something of the nature of a covert threat in one of the "objections" of the Mining Association. They say: "To keep the pits in full production, collieries supplying gas coal must work full pressure in the summer season. If the owners enter into contracts such as will keep their pits working full time over this period, they cannot reasonably be expected to give the gas companies the required 50 p.ct. greater output and delivery in winter." This is nicely put; but all the same we see in it something minatory. They proceed to speak of the effect of the reversion upon production costs, and then of the influence upon the related iron and steel industries of short-time colliery working in summer, through the supplies of small coking coal being affected. This is a submission that was not raised during the large number of years when the 60 and 40 p.ct. proportions were customary; and it is only now that the colliery owners find that to return to this rule would be "retrograde."

The whole argument of the Mining Association ignores completely the economic conditions of the gas undertakings themselves. The production costs of the collieries and the position of the iron and steel industries receive consideration; but no regard is paid to the effect upon the production costs of gas undertakings of putting into store in summer and taking out of store in winter anything more than a prudent reserve demands. Coal storage is an expensive thing. Interest has to be paid upon the money spent on the coal, while it is lying idle; and coal handling from store to retort is more costly than direct delivery from railway wagons to the retort-house coal-handling plant and hoppers, and thus immediate carbonization. The Mining Association are painfully narrow-minded, in respect of this particular matter, in their attitude and arguments. The 40 p.ct. has in most cases included a prudent reserve for winter; and that is something for which the colliery owners should be thankful. We suggest that the Association should endeavour to look at this matter from the point of view of their excellent customers the gas undertakings, instead of restricting consideration to the point of view of the collieries.

May we just remind the Mining Association of a few figures which appositely bear upon this question? Last October, the exports of coal included 810,998 tons of gas coal, which compared with 472,082 in October, 1921, and 164,119 tons in October, 1920. In November last, the gas coal shipped totalled to 902,028 tons; in November, 1921, to 454,086 tons; and in November, 1920, to 160,339 tons. In December last, 759,486 tons of gas coal were shipped; in December, 1921, 675,953 tons; and in December, 1920, 292,991 tons. In January of this year, 704,360 tons of gas coal were exported, as compared with 501,723 tons in the same month of 1922, and 210,235 tons in that of 1921. Thus there has been a large growth of gas coal exports in all the winter months. Taking the whole of 1922, the quantity of gas coal shipped was no less than 9,197,544 tons, as against 3,740,744 tons in 1921; and 2,204,571 tons in 1920. The average value of the quantity exported last year was a trifle over £1 2s. per ton. Does anyone detect in this growth of the gas-coal export business, particularly during the winter months, any ground for the "anxiety" of the colliery owners over the proposed reversion to 60 p.ct. winter and 40 p.ct. summer deliveries to home gas undertakings? Anyway, we suggest that the figures should be considered in conjunction with the arguments submitted by the Mining Association. To say the least, the figures are interesting and, we think, enlightening.

The Defects of the Cubic Foot.

THE cubic foot is not defective volumetrically; but there are inherent defects in it in certain of its applications to gas. Many of us are agreed that the selling of gas on the 1000 c.ft. basis is not sound, in that 1000 c.ft. in one town is not the same thing to a consumer in another town. Dr. Carpenter drew attention to another defect in his address at the recent meeting of the proprietors of the South Metropolitan Gas Company; and it was that to-day costings on the 1000 c.ft. basis are altogether vitiated for comparative purposes for the same reason. Now we turn to the extremely interesting address with which Mr. R. E. Gibson, of Liverpool, inaugurated his year of office as President of

the Manchester District Institution of Gas Engineers, to find that, on both the 1000 c.ft. and the therm bases, he is—in the case of his Company—in a state of perplexity as to determining precisely the business progress that has been effected during the past decade. But more so on the 1000 c.ft. basis than on that of the therm. But, of course, Liverpool to a large extent stands alone in this respect. The Engineer will not have to tell the same tale in (say) another five years. He will be able, by the therm system, to gauge exactly what has been the progress, and what have been the relative costs in all particulars.

We firmly believe that the great trouble in determining accurately what has happened in Liverpool in regard to business progress in gas supply is due to the extraordinarily high calorific power gas that was supplied in pre-war years —a gas of a gross calorific value of 685 B.Th.U. It comes almost as a shock to us to read that it was away back in 1907 that the late Mr. Edward Allen read a paper before the Institution of which his successor at Liverpool is now the President, advocating high quality gas, and making reference to the "disc of burnished gold." We remember the little raillery we had with our friend, Mr. Allen, over those words, when the paper was originally published towards the end of 1906. But the time came when the Liverpool Company receded from their high ideas—forced probably more by changed economic circumstances, than by anything else—to the thoughts and practices that had become even then well established in the British gas industry, and that have made further progress through the impelling circumstances of war time, and since through the encouragement of the Gas Regulation Act, to do the best possible, within the limits of one's individual conditions, for both gas undertaking and the consumers. The thermal change at Liverpool is the best possible answer to Mr. Allen's paper of fifteen years or so ago. In 1911-12, the Company were supplying a gas of 620·37 B.Th.U. gross. But in the past five years, the value has varied between 478·84 B.Th.U. and 490·13 B.Th.U. (1922). In 1920, the increase in the cubic feet consumption, compared with the year of 620 B.Th.U. gas, was 45 p.ct.; the increase in the therm consumption, only 12 p.ct. There are good reasons for not regarding with any uneasiness the drop in the cubic feet sales in 1921 and 1922, in view of the coal strike and general industrial and commercial depression. The cubic feet figures in the past two years show a 38 and 35 p.ct. increase on the 1911-12 consumption of high-grade gas, as compared with the 45 p.ct. increase of 1920; and the therm increases are respectively only 8 and 7 p.ct. on the 1911-12 therms, as compared with 12 p.ct. in 1920. But taking the therm increase of 7 p.ct. for last year, it suggests small progress in the business of the Company when contrasted with 1911-12. The decrease in calorific power between the opening and closing years of the decade has been 21 p.ct., the volume increase in consumption 35 p.ct., and the therm increase 7 p.ct.

Looking at these figures, what is to be made out of them? Mr. Gibson cannot interpret them with any degree of satisfaction to himself, or to anyone else. The volumetric consumption shows very little increase compared with the reduction in calorific power; and a 7 p.ct. increase in the therm consumption is not a remarkable showing for a decade. In other words, the business (ignoring all outside influences) appears to have been doing little more than marking time, when considered on the therm basis. Well now, we cannot help thinking that a very large part of the explanation of this is due to the fact that the greatest progress made by the Liverpool gas supply has been the progress of efficiency in the utilization of gas through the gradual drop from 620·37 to 490·13 B.Th.U. gross per cubic foot. The inefficient use and waste of 620 B.Th.U. gas charged for on the thermal basis means much more to the consumer than gas of 130 B.Th.U. lower value; and we believe that the consumers of Liverpool have been progressively obtaining more duty from the lower quality gas considered thermally than from the higher quality of a decade ago, and that this is one reason for the relatively meagre progress of total business suggested by the therm figures. Moreover, it is probable that, as "discs of burnished gold" are no longer available, the economical incandescent burner is now more generally used than formerly. If the assumption is true, then the Company have been pursuing, during the decade of thermal reduction per cubic foot, a policy that has considerably strengthened the foundations of the business. The Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University have shown that adjustment of air supply to a high grade gas is a more serious and critical business than with a lower grade gas; and the nicety of adjustment requisite with the former cannot be expected, and would be rarely obtained, in everyday procedure. This is especially the case with many prepayment consumers; and one cannot get away from the fact that, where there is wasteful use of gas on (say) the top plate of cookers, every cubic foot so wasted means more charged on the thermal basis than with a lower grade gas. We cannot help entertaining the view that more economical use through the low-grade gas is, in a substantial degree, accountable for certain of the figures in the address.

The analysis that Mr. Gibson makes of the variations that have occurred in the consumption of ordinary and prepayment consumers rather supports the view just expressed —particularly the average sale per ordinary consumer. The opposition to the argument comes from the prepayment consumer, whose average therm consumption has increased considerably. That is quite the proper order of things, in view of the fact that over a whole twelvemonth, ten years ago, the average therm consumption per prepayment consumer was only 69; and last year it was 103. We read into this the growing appreciation by the working-class part of the population of the labour-saving and other conveniences of gas; and an average increase of 34 therms in a decade is not more than one would expect, having regard to experiences in other places. The policy of Liverpool, whether in dealing with ordinary or prepayment consumers, is such that it tends to economical use. Mr. Gibson advocates the most efficient burners being employed, and special care being taken to ensure correct adjustment and maintenance. He is opposed to the use of anything that is detrimental to the business. We reiterate that on all grounds the policy at Liverpool has meant for the consumer economy in consumption through the efficient use of a more useful grade of gas. As to the best quality of gas to make, Mr. Gibson is of opinion that 500 to 550 B.Th.U. will, speaking generally, be found most convenient. The lower figure is nearer the general practice than the higher one; and it is closer to what the Liverpool Company are now supplying. But the great reduction of calorific power that has been made in that city, by a gradual process, has been achieved (for this Mr. Gibson vouches) without serious trouble or inconvenience. It is not all gas engineers who have had the opportunity of gaining the experience of a descent from such a thermal peak as obtained in Liverpool a decade ago to the more normal level of a gas of just under 500 B.Th.U. per cubic foot; and the experience is useful. Perhaps had the descent been made earlier, parts of Mr. Gibson's comparisons would not have appeared in a Presidential Address which is more than ordinarily interesting, because the conditions there have not been usual.

There are several other features in the address; but we would particularly direct the attention of readers to the experimental work at Liverpool on the dry quenching of coke —the product showing an improvement in fuel value of 22·7 p.ct. Mr. Gibson supplied interest from the beginning to the end of his presidential deliverance.

A Study of Lighting Burners.

A great deal more attention is now being bestowed than was formerly the case upon the lighting branch of the gas business. We are not going to indulge in any criminatory remarks on the subject, beyond saying that indifference on the gas side has been largely responsible for much of the success that electricity has had in competition for lighting. We know full well that gas can hold its own in lighting in respect of economy and efficiency. But the gas industry—speaking generally—has shown itself a bad tutor, and has allowed in large measure the one point of convenience in electric lighting to override merits of gas lighting that should have supremacy in competition, if every point of relative virtue was brought into account. Dr. Carpenter emphasized these matters in his classical Institution paper, and now Mr. F. V. Barnes, of Todmorden, has done the same thing in a paper which he read last Saturday before the Manchester Institution of Gas Engineers, and which we shall be reproducing in our next issue. First of all, there has not been in the gas industry the effective campaign against poor and inefficient lighting fittings and burners that was necessary, and there has not been the consistent study of efficient installation for situation and purpose that there should have been. Tradition has continued to have con-

siderable sway; and competition has not so thoroughly altered methods as one might have expected. But there have been welcome signs of altered outlook and action in these respects; and what Dr. Carpenter has accomplished, and Mr. Barnes and others are doing, is all helping forward the elevation of work in the lighting branch of the business of the gas industry. Competition must be taken seriously; and the only way to meet competition is to press for the adoption of the best that we can develop or have to offer. Our electrical friends do not hesitate to point to the ugly effects and appearance of bad and inefficient gas-fittings. The gas industry need have no squeamish feelings about prominently advertising the qualitative merits of their lights. Is the eye more important to a human being than the convenience of lighting-up and extinguishing by switch, which can also be done with gas by the use of a pilot-jet? There is only one answer; and yet the gas industry does not emphasize the merit with that insistence that the electrical industry does the convenience and economy of being able to switch on and off as required. With electric light, the user has to be defended against its physical characteristics, or take the consequences in impaired vision. With gas lighting, there is neither the same intrinsic brilliance, nor the harmful degree of ultra-violet and infra-red rays. In these two respects gas lighting possesses superior merit; and there are others—such as the ability to contribute to the ventilation of rooms by making quite simple provision.

Inherent qualities provide one aspect of the position of gas lighting which should, properly used, carry it far in the competition. But a drawback that has to be combated is the uncomfortable prevalence of indifferent fittings and burners—badly made, ill-proportioned, and of inferior material. To a very large extent these are imported. The British manufacturers of standing in the industry can and do produce fittings that are a credit to themselves and to the industry; but, unfortunately, the industry has no complete control over the purchases of the consumers. The result is that the sins of the fittings and burners fall upon, and do infinite harm to, the gas supply. Mr. Barnes was led into an investigation of burner design and construction by the fact that, after the war, a considerable number of the burners in his street-lamps required renewing. This being so, he decided to ascertain how best he could eradicate the defects that experience showed existed in those he had, and how improvement could be effected so as to realize the highest possible efficiency. He has come to the conclusion that it is a foolish policy to save a few pence in the first cost of such a vital contributor to lighting efficiency as the burner, when the best sorts give much better duty, and effect savings in maintenance. The paper gives an account of the experimental work that Mr. Barnes has done in this direction, and from which he has developed the burners which he now uses, and naturally therefore advocates. It is clear that theoretical considerations did not greatly trouble Mr. Barnes in his work of discovering what he wanted. He preferred to proceed empirically, and has accomplished much by his practical investigation.

There must be reference to the paper and the drawings to ascertain the character and results of the work accomplished. But it will be remarked from the text and the polar curves that the best efficiency with a multiple burner lamp is secured by arranging the mantles in zig-zag fashion instead of in a circle. In this way, it is easy to replace mantles without damaging those adjacent; and when viewing the long side of the mantles, a continuous band of light is presented. A six-light burner so arranged, it is seen, gave an average of 344 C.P. between 0° and 20°, at right angles to the long axis of the burner, and 191 C.P. at right angles to the short axis. An ordinary six-light circular cluster under the same conditions gave an average of 250 C.P. between 0° and 20°. The new burner was consuming 18 B.Th.U. per candle-power-hour, which we calculate to be 13·76 c.ft. of 450 B.Th.U. gas. We are pleased to see that Mr. Barnes, in presenting his curves, has expressed the consumptions in definite terms instead of in cubic feet of unknown thermal value, as is so often the practice. He has also carried his work into the domestic burner sphere; and the improvements he describes in the paper have been effected by a study of every part. That the burners he has produced are a success is shown by the approval which has yielded a good influx of orders from the public, who appreciate the better service with an equal or lower consumption of gas. Indeed, the author tells us that the installation of electricity has been checked in not a few cases by the greater efficiency realized by his burners.

In heartily congratulating Mr. Barnes upon his work and the results, it may be remarked that all such investigation is advantageous, as one never knows when it is going to produce something that will prove of advantage to the gas industry generally. But in burners we must get to something like universal standards in order to achieve the very desirable end of the best economy (consistent with life and efficient service) in installation and maintenance. This would not be realized by every gas engineer having burners made to special designs.

Physical Properties of Coal in Continuous Vertical Retort Working.

WHILE it is true that any kind of coal can be carbonized in continuous vertical retorts, it is equally correct to say that the physical characteristics of coal play a very important part in the realization of maximum efficiency in such retorts. This point has been brought out in various papers that have been read by gas engineers with experience of different varieties of coal; and the latest contributor in this regard is Mr. J. Poulson, in the paper he read before the Midland Junior Association, upon his experiences with the working of the Glover-West retort-settings at Stafford, which have been in operation since 1919. During this period, many varieties of coal have been tried; and gas and bye-product yield, rate of carbonization, throughput, fuel consumption, &c., are all found to be influenced by the physical properties of the coal. The experiences are very similar to those that Mr. T. Carmichael, of Portsmouth, presented in his Southern Association paper towards the end of last year. Easily carbonized coals must, of course, mean a greater throughput, and must also result in fuel economy; and these two factors combined contribute to lower manufacturing costs. A dusty coal will have the opposite effects, through the retardation of heat transmission; and reduced throughput and operating difficulties are brought about through dust if the coal is a highly caking one. The size of coal has also an effect on the speed of carbonization. Mr. Poulson's experience is that a better decomposition of steam also takes place with an easily carbonized coal, owing to the coke being of open texture and friable nature, and the size rather small and regular. In consequence, the gases have a longer time-contact with the coke, and at a higher temperature, due to the carbonization of the coal being completed at an early stage of its passage through the retort. Mr. Poulson uses washed nuts, with a small proportion of beans, from Derbyshire and North Staffordshire; and steaming to the extent of 21 p.ct. (taken on the wet basis of the coal), with a steam pressure of 28 lbs., he makes 18,500 c.ft. of gas of an average calorific value of 437 B.Th.U., which is equal to close upon 81 therms per ton. He has 7¾ cwt. of coke available for sale, after making allowance for the coke used in steaming and for the producer fires, with a deduction for coke dust. The average ash in the coke is only 8·09 p.ct.; and its free-burning quality and low moisture content are appreciated by the users. The yields of tar and sulphate of ammonia are good. Many details of working are given in the paper, which supplies all the evidence required of that careful supervision over working which secures the desired results. A small vertical Spencer-Bonecourt waste-heat boiler has been in use on one of the settings. Sufficient testimony as to experience with it is supplied by the statement that the installation of a similar boiler of larger capacity is in progress; and the application of further waste-heat boilers in the near future is contemplated.

An Analysis of Accounts—The Therm the Only Reliable Basis.

WE have pleasure in publishing to-day the analysis, made by Mr. F. J. Bradfield, Secretary of the Commercial Gas Company, of the accounts for last year of the three London and four principal Suburban Gas Companies. He has again supplied the figures per 1000 c.ft., as well as those on the therm basis. The inclusion of the former has only been in response to requests from certain gas administrators; but a comparison of the two tables should now suffice to show how misleading, when comparing one Company with another, is the 1000 c.ft. unit, and that the therm is the only really safe one. Take for five of the Companies the gas made per ton

in quantitative order under the two systems of comparison; and we get these divergencies:

	Cubic Feet per Ton.		Therms per Ton.
1. Wandsworth	14,613	5. South Metropolitan*.	70·65
2. Tottenham	13,655	1. Wandsworth†	69·93
3. Commercial	13,406	2. Tottenham†.	69·37
4. Gas Light	12,906	4. Gas Light†.	69·18
5. South Metropolitan	12,729	3. Commercial†.	69·07

* Declared Value. † Works Tests.

There we see the last Company on the 1000 c.ft. side is the first on the therm side, and the third in the first column becomes the last in the second. On the therm basis, the four Companies whose output is on the actual calorific value and not the declared, run each other very close, though there is considerable variation on the cubic feet basis. The same thing appears in almost every relative line of the analysis. Taking the cost of coal, &c., the order of merit under the respective bases is as follows:

	Per 1000 C.Ft. Pence.	Net Cost (Less Residuals). Pence.
1. Gas Light	27·39	13·38
2. Commercial	28·92	11·91
3. Tottenham.	29·59	16·07
4. South Metropolitan	31·18*	13·7*
5. Brentford	31·18	19·05
6. Wandsworth	31·60	14·68
7. South Suburban.	31·90	16 31

* Less 3·28d. brought forward.

	Per Therm. Pence.	Net Cost (Less Residuals). Pence.
1. Gas Light	5·61	2·74
4. South Metropolitan	5·62†	2·47†
2. Commercial	6·09	2·51
3. Tottenham.	6·25	3·39
6. Wandsworth	6·73	3·13
5. Brentford	6 78	4·14
7. South Suburban	6·94	3·55

† Including 0·59d. brought forward.

It will be observed that, though the South Metropolitan Company is fourth in the per 1000 c.ft. group, it should in reality be second, in view of the amount brought forward (due to the coal strike), and charged up to the year. For the same reason, it should stand at the top under the therm cost for coal. The figures also indicate the variations that there were in the receipts for secondary products both per 1000 c.ft. and per therm. The therm is bringing every undertaking to its proper position in respect of working merit, though it must always be remembered that coal costs vary greatly by reason of location, as, for instance, in the cases of the Brentford and South Suburban Companies in comparison with the three London Companies.

In connection with the extravagant statements made during the high gas accounts trouble last year, when it was alleged that gas consumptions made uncanny flights, it is interesting to note that the total increase in the sale of therms by the Gas Light Company was 8·4 p.ct., Tottenham 4·98 p.ct., Brentford 4·07 p.ct., South Suburban 3·66 p.ct., and South Metropolitan 3·55 p.ct.; while Wandsworth had a decrease of 1·23 p.ct. and the Commercial Company 0·01 p.ct. This does not support the charge that accounts that were 100 p.ct. or more in excess of the corresponding periods of the previous year were representative of a general experience. Bearing upon the carbon monoxide agitation, only 30·99 p.ct. of the total make of the Gas Light Company was water gas, 25·64 p.ct. of the total Tottenham make, 24·43 p.ct. of the total South Suburban make, 18·56 p.ct. of the total Commercial make, and 9·53 p.ct. of the total Wandsworth make.

Mr. Bradfield's analysis is of great interest; and it fully confirms what Dr. Carpenter was saying last week as to the therm being the only safe foundation on which to make costings. The 1000 c.ft. basis must be discarded, as upon it the variations in the thermal value of the cubic foot altogether vitiate working and cost calculations and comparisons.

Dividends and Standard Prices.

It will be regarded in public quarters as evidence of a distinct desire on the part of gas undertakings not to take advantage of standard prices fixed in other economic circumstances than those that obtain to-day, that various companies operating in and about London have not paid the full dividends for last year to which they were legally, if not morally, entitled. We hesitate after writing the words "if not morally," because the lean dividend years of wartime and after rise up in protest. But those years are past; and when dividends have reached a fair point—though Stock Exchange values have not responded all along the line and brought us to pre-war standards—Directors are showing a wise discretion in staying their hands and their recommendations. There is a duty not only to proprietors, but to consumers, who also have suffered through heavy prices during the years of war and succeeding ones. There is, too, the promotion of new gas business and the revival of trade generally to be thought of; and gas prices that are as low as is possible are important factors in the position to-day. We shall later reap the benefit of wise administration in the present.

The Gas Leakage Conference.

The private conference on gas leakages that was recently held at the Board of Trade appears to have been a most amicable affair. The feeling that prevailed was that, though gas as a risk has a much smaller toll of victims than many other public conveniences and utilities, if anything reasonably possible can be done to reduce trouble by co-operative means, then it should be the aim of all concerned to contribute their part to doing it. We have not had the opportunity of reading a report of the proceedings at the conference; but it is generally known, through that effective, if not always truthful, agent rumour, that in the unavoidable absence of Mr. D. Milne Watson the President of the National Gas Council, Mr. F. W. Goodenough stated the position of the gas industry in the matter of risks from gas leakages. We can well imagine that one strong point he made was that the gas industry throughout (knowing that a good reputation goes a long way in business) is desirous, while rendering the most economic service, to receive the co-operation of all public bodies and gas consumers in doing everything possible to minimize any risk. The recommendations arrived at show that this was the prevailing feeling. The conclusions have been set out *in extenso* in the Parliamentary Debates; and from that source they are reproduced to-day in our "Miscellaneous News" columns. Co-operation between the local authorities and the public on the one side and gas undertakings on the other is the outstanding feature. The question of the inspection of gas-fittings and the discouragement of the use of dangerous apparatus, or apparatus fixed in a dangerous manner, is to be considered by the bodies represented at the conference; better methods of notifying escapes, and of warning consumers of the danger of neglecting leaks, are under consideration, as well as the question of giving statutory powers to gas undertakings to prescribe and to inspect gas fittings and apparatus in houses and other buildings.

Round Harley Street.

Touching upon the question of carbon monoxide, Mr. Henry Woodall, in his address from the chair at the meeting of the Tottenham Light, Heat, and Power Company, made this interesting statement: "It may interest the proprietors to know that the district in London where the largest amount of gas per acre is used is round Harley Street. This is, as you are aware, the centre of doctors and nursing-homes, and where one would expect to find the greatest care exercised in providing the most healthy surroundings. In cases of sickness, the availability of gas for many purposes—chiefly for fires—is rightly regarded as invaluable. This fact should go some way to satisfying the public that they have nothing to fear in using gas. Its use has saved many lives, while its abuse has unfortunately cost a few."

Daylight Saving in France.

Strenuous efforts are being made by the advocates of daylight saving in France to secure the restoration of summer time this year, although it was decided by the Chamber last year that there should be no more altering of time.

A Munificent Gift for Research.

The scientific and technological world was greatly gratified last week on learning of the magnificent gift that Sir Alfred Yarrow has made to the Royal Society, to be used as capital or income, as the Council may think fit, for the better promotion of original scientific research. The sum is £100,000. Sir Alfred believes that the prosperity of this country has been greatly hampered in the past for the want of better promotion of scientific investigation and its application to practical affairs; and he is convinced that the future prosperity of the country will be largely

dependent upon the encouragement of original scientific research. Sir Alfred marks his sense of the great value of research to the community by this gift. We are wondering whether part of the proceeds of the sum will be devoted to research useful to the fuel industries, and therefore to the country at large.

Coal Output Last Quarter.

During the quarter ending with December last, the output of saleable coal was 67¾ million tons—a figure which has not been matched in the same quarter since 1913. It is calculated that there were 1,139,000 persons employed in and about the mines, including clerks and salaried persons—the figure being 22,000 in excess of the number employed before the war. Excluding clerks and salaried persons, the average number of wage earners during the quarter was 1,119,300. At the end of December there were 1,129,500. The quantity of coal available for consumption in the United Kingdom during the quarter was 42⅔ million tons (allowance being made for the coal equivalent of coke and manufactured fuel exported), or nearly 5 million tons more than during the previous quarter. In the corresponding quarter of 1913, there were 47⅓ tons of coal similarly available. In these figures, no allowance is made in either period for the difference in the stocks held at the beginning and the end of the quarter.

Gas Coal Exports.

In January, the shipments of coal from this country continued their upward course. The total was 5,611,670 tons, with a value attached of £6,295,820. The proportion of the exports classified as gas coal was 704,360 tons, which compares with 501,723 tons in January last year, and 210,235 tons in January, 1921. The value of the 704,360 tons shipped last month was £783,996, or an average of £1 2s. 3d. per ton.

Gas Coke Shipments.

In January, 94,455 tons of gas coke were sent abroad, compared with 67,709 tons in January last year, and 31,619 tons in January, 1921. The value of the 94,455 tons totalled to £131,237. In January, 1921, the 31,619 tons then shipped had the greater value of £135,504. The value last month works-out to an average of £1 7s. 9·4d. per ton.

Sulphate of Ammonia.

The exports of sulphate of ammonia last month amounted to 23,836 tons, compared with 16,854 tons in January, 1922. The respective values were £409,462 and £266,380. The value last month averaged about £17 3s. 6d., which compares with £15 16s. 1d. in January last year.

Oil Imports.

The total quantity of petroleum products imported last month was 114,467,540 gallons, which compares with 96,445,535 gallons in January, 1922. Among the items, we notice that gas oil accounted for 7,864,189 gallons, as against 10,046,813 gallons in January last year. Fuel oil led with 30,754,582 gallons, compared with 22,253,698 gallons. Motor spirit stood at 22,257,904 gallons, as against 25,788,604 gallons. Illuminating oil made a big spurt—23,767,340 gallons, contrasted with 11,145,846 gallons.

PERSONAL.

The reports just issued of the Sunderland Gas Company and the Sunderland and South Shields Water Company intimate that Mr. SAMUEL P. AUSTIN, J.P., has resigned his seat on both Boards. The vacancy on the Water Board has been filled by the election of Mr. NORMAN S. COX, the Secretary of the Sunderland Gas Company. Mr. W. F. VINT is Chairman of both Boards, while Messrs. T. W. STUART and W. SEWELL are similarly Directors of each Company.

Mr. T. CASE MORRIS, who during last year resigned his position as a Director of the Liverpool Gas Company (to the sincere regret of all his colleagues), continues to take a great interest in the welfare of the Company. He was first elected in October, 1892, and has been since then an active and most useful member of the Board. He succeeded his father, Mr. John Grant Morris, who had himself been first elected in August, 1855; so that his family's connection with the Company has extended over a very long period. The Directors have appointed Mr. G. C. CLAYTON, M.P., to fill the vacancy; and they feel confident that, with his training and business experience, he will prove a valuable addition to the Board.

ELECTRICITY SUPPLY MEMORANDA.

PUBLIC lighting just now has a great attraction for municipal bodies who trade in electricity. This is one of the drawbacks to municipal trading where a competing agent is concerned which is under private enterprise. Some of these municipal bodies forget, either conveniently or unconsciously (we have our own views as to which it is), that their functions comprise efficient and economical administration in every particular. Where public electric lighting is concerned, some of them strive for economy by having recourse to a lower efficiency. We saw recently how at Hastings there were bitter complaints over the small-unit lamps that were used for the electric lighting of the streets; and there were strong requests that the pre-war amount of illumination should be restored. Every town, especially a seaside town, should supply, not glaring lights, but a sufficiency of illumination for safety and cheerfulness, and to enable the police efficiently to perform their duties, which naturally are more arduous after daylight fails. Anything that is not adequate (we do not say excessive) is neither economical nor efficient. Uneconomy in the conversion from gas to electricity starts at the capital expenditure involved; for it is enormously more expensive to effect such conversion than to modernize the gas lighting in the most approved fashion, and so gain more illumination at a cost that will probably not be greater than with the old-style gas-lamps. We have seen that gas for public lighting has scored at Newmarket and Beckenham quite recently, in the matter of new contracts. In the Newmarket instance, the electric lighting Company were not prepared to face the capital expenditure involved; in the case of Beckenham, although the electricity undertaking belongs to the Council, this body reversed a decision to make a large conversion to electricity, in view of the fact that the South Suburban Gas Company were able to make an offer which the Council, as the guardians of the public purse, could not reject. If all local authorities would remember that their primary functions are administrative in the public interests, and that trading must take a subsidiary place, then we should hear very little about conversions of street lamps to electricity. We do not deny that there is in many towns plenty of room for the improvement of public lighting by gas; but elsewhere there is abundant demonstration of what can be done by modern gas methods.

Lowered Efficiency not an Economy.

A Defective Estimate at Hove.

Our news columns last week offered an example—a sort of thin-end-of-the-wedge example—of what we have been saying about street-lamp conversions from gas to electricity, which mean neither economy nor efficiency. Hove is the place; and had the people of Hove not had a keen critic in the Engineer and General Manager of the Brighton and Hove Gas Company (Mr. C. H. Rutter), who naturally was looking after not only their interests but those of his Company, a conversion might have been effected without adequate investigation. Whatever is the issue to the controversy over this matter, the ratepayers of Hove now know that the scheme as originally presented to them was not exactly what it seemed to be. It is easy enough to show an annual saving in running expenses by the substitution of one thing for another, if the service rendered is of less amount; it is equally possible to establish on paper a saving in maintenance costs if in the case of one agent there is an under-estimate and in the other case an over-estimate. This has happened at Hove. We do not say that there has been any deliberate intention to deceive; but there has been a mistake. Now in this case it is only the lighting of the sea wall and promenade that is in question; but there is no reason why this prominent piece of lighting in Hove should be lost by the Gas Company without justifiable cause. And there is none. The lighting of the sea wall and promenade, it seems, has not been resumed since the outbreak of the war. The time has long arrived when it should be; and so the matter is to be taken in hand. Now let us see. There were 43 gas-lamps. It does not matter what they were before; what is important is what they are proposed to be now, if gas be adopted. Everything new in the way of fittings would be required—new lanterns and burners. It is suggested that the lanterns should be fitted with burners equal to 350 c.p. (four inverted mantles clustered in each); the cost of the improvement being £400. This would give an aggregate of 15,050 c.p.; and the estimated cost per annum would be £264, or 2·28d. per candle-power. The electric installation would consist of 23 200-watt gasfilled lamps—all new standards and everything—and the cost of conversion would be £1035, or £635 more than for gas. It is claimed that the candle-power per electric lamp would be 400; and the total maintenance cost per annum £158, or £106 less than gas. But the candle-power on this computation would be 9200, or only 61 p.ct. of what gas would give in the new lamps. Put another way, gas by giving 15,050 c.p. would supply over 60 p.ct. more light than the 9200 c.p. of the electric-lamps.

Criticism of the Figures.

Our first criticism of the figures is the folly of assuming that the electric-lamps are half-watt ones—400 c.p. being claimed for 200 watts. No end of tests of such lamps have been carried out; and the growth of knowledge

of the misrepresentation of "half-watt" lamps led to the new description of "gasfilled." The tests have proved consumptions from 0·65 to 0·75 watt (sometimes more) per candle power. Therefore, when new, the 200-watt lamps would furnish about 300 c.p., or very little more. Thus, the 23 lamps would give 6900 c.p., compared with the 15,050 of the gas-lamps. Should the Hove sea wall and promenade have a night illumination of 6900 c.p. or 15,050 c.p.? There can be but one answer; and the Hove people ought not to be content with less than the latter figure, and certainly not with the fictitious figure of 9200 c.p. for the electric lamps. Moreover, the lighting power of gasfilled lamps has a notorious and capricious habit of depreciating; and they are not amenable to cleaning in the way which will uniformly maintain the illuminating value of inverted gas-lamps. Then, again, with gas there would be 43 points of lighting, and not 23 as with electricity, and the gas-lamps would be on pillars 9 ft. 3 in. in height, and not 20 ft. as in the case of the electric lamps. Now both in respect of number and height, the light distribution of the electric lamps could not be as good as with gas; at the level at which people move and have their being, the illumination with the electric lamps under those conditions would be infinitely inferior. We come to the figures of maintenance; and both in respect of the gas and the electric lamps, they are wrong; and time would prove them to be so. Mantle renewals are nothing like the estimate; electric lamp renewals are taken on a basis which practical experience suggests is highly imaginative. Electricity is charged at only half the cost of the unit to the ordinary consumers, while gas is charged at the full cost per therm. But these figures are dealt with in the criticism that Mr. Rutter has made (as reported last week). On all grounds, there is greater value for money, and would be greater satisfaction, in the gas scheme than in the electric, without taking into account the generous offer of the Gas Company to instal at their own expense similar lamps over an extended front. The matter is still under consideration at the time of writing. It will be interesting to see whether prudence, economy, and efficiency will guide the Council, or whether the "pull" of the electricity undertaking will be sufficient to induce a majority of the Council to vote the other way.

Impeccant Electricity.

Electricity is regarded by electricians as sacrosanct. When a fire is attributed to it, they jeer. It must have been a cigarette end or a spark from some unknown source. If anyone questions the economy of electricity for cooking and heating, there is ridicule. The weakness of the foundation for the ridicule has to be discovered by a course of practical experience, of which the bill is the painful part. If anyone points to the glare of electric lamps, and the composition of the light, as being injurious to the eyesight, they laugh—excepting those who are wise enough to acknowledge that the electric lamp and the eyes should have some neutralizing medium between them. If anyone is killed by electricity at a voltage of 220 or under, there is a profound search in some quarters for an alternative reason—the thing is impossible; and yet annual returns show it to be possible. If houses are wrecked and people killed by the gas generated by a bitumen-covered cable in which there is fusion, this is by-passed in silence. If electrically generated sparks in a mine cause an explosion and fatalities, little is said of the matter electrically. If electrical trouble occurs on a tube railway and produces panic, it is an incident unworthy of notice. Such events as the consumers' deprivation of electricity supply by a small or large cause are too commonplace to keep track of them all in the electrical press. But if anything untoward occurs with gas (the popularity of which is shown by its extensive use for all purposes), then there is something that electrically merits the widest publicity; and use is made of it in electrical propaganda.

Electric Light and Eyesight.

The electrical papers have been greatly offended by Mr. A. E. Bawtree, through a lecture he delivered before the Royal Photographic Society. In this he blamed electric light for serious eye troubles. Of course, he was not far wrong, because of the very general misapplication of light of such high intrinsic brilliancy, for which the electrical industry is largely to blame. The prevalence of eye disease, he said, synchronized with a radical change in our method of artificial lighting. He felt that mankind should take the bold step of reverting to candles. We sincerely hope not, and trust that Mr. Bawtree will find a compromise in gas. There was a good deal of truth in what the critic had to say. For instance, every time one looks into an electrically lighted shop window, or gazes along a brightly illuminated street, whenever a person has within the field of vision the electric lamps in church or concert hall, or whenever the light from the domestic illumination strikes the eye direct or by reflection from mirror, silver tableware, or polished knitting needles, the retina is being seared with a ray of from eighty to hundreds of times the intensity which it can safely endure. The town dweller, to whose eyes the electrician has imparted such violent and unnatural strain, suffers a terrible penalty. The use of alternating current should be avoided among workers who spend much time under the electric light. "Alternating current sets up in the nerves of the body what are known as induced currents. Induced currents in the nerves from an alternating electric supply are very much more injurious than much natural and conscious effort." While colour itself has no injurious effect, white lights always contain a dangerous force which is virtually absent from the yellow flames to which man is adapted. This is the ultra-violet ray. This ray is quite useless to the eye, being invisible; and it is always harmful. All natural objects, trees, stones, earth, and most flowers destroy the ultra-violet rays; thus preventing their being largely reflected into man's eyes when the high sun pours them down. "It was left to the electrician to flood our homes, streets, and public buildings with the very poison from which Nature so beautifully guarded us." Mr. Bawtree asserts that the large white bowls now often seen under electric lamps are no protection from these rays. The rays pour down in floods by reflection from the white ceiling; and they pass almost as readily through the bowls as if they were not present. Electric light also produces other known emanations of more or less dangerous character, such as X-rays, and torrents of electrons, while we are from time to time finding out new emanations. It is possible that this form of illuminant is sending out baleful influences of the very existence of which we are not yet aware." The final goal, said the lecturer, is a return to the open flame, and the recovery of healthy eyesight is an end which is well worth the inconveniences from which we imagined that our forefathers suffered. No wonder the electricians do not to-day like Mr. Bawtree. But to be fair, there are ways and means of neutralizing many of the baneful effects; but they are not generally applied.

The London District.

An Order has been issued by the Electricity Commissioners constituting the London and Home Counties Electricity District, and incorporating an Electricity Authority. An inquiry into the scheme will be held on March 12. The district is the same as the one that was defined following the inquiry in the summer of 1921—viz., the administrative counties of London and Middlesex, the county boroughs of Croydon, East Ham, and West Ham, and parts of the counties of Berks, Buckinghamshire, Essex, Hertford, Kent, and Surrey. The Commissioners appear to have attempted to effect a kind of compromise between the local authority and company interests. Provision is made for the establishment of a Joint Authority; and this is to appoint two committees—one known as the Committee of Local Authority Undertakers (consisting of eight members), and the other the Committee of Company Undertakers (six members). The Joint Authority is also to appoint a Technical Committee, consisting of two members nominated by the Local Authority Committee, two nominated by the Company Committee, one member representative of the Power Companies, one member representative of the Railway Companies, and three members nominated by the Joint Authority. One member nominated by the Local Authority Committee and the Company Committee respectively, and the three members nominated by the Joint Authority, need not be members of the Joint Authority, but shall be persons possessing the requisite technical qualifications to enable them to assist in the functions of the Committee. This appears to be a complex arrangement, and it all savours very much of compromise. It is provided that the Joint Authority may delegate their powers to the two Committees; but apparently there is a limit to their active life. It is proposed that they shall continue in being until the whole of the generating stations and main transmission lines of the local authorities and the companies respectively have become the property of the Joint Authority. The principles to apply to purchase and rental terms are named. The systems of supply are to be as nearly uniform as possible. The constitution of the Joint Authority in respect of the representation of existing interests is defined. The technical scheme is also dealt with; and it is seen that there is to be a large amount of scrapping of stations and plant when supplies are available at rates justifying their closing down. The Commissioners have also drawn up a scheme of transmission lines, so as to make effective use of the generating stations and sub-stations mentioned by them in the Order.

Manchester and District Junior Gas Association.—Next Saturday afternoon there is to be a visit of members to the Macclesfield Gas-Works. After tea, the Engineer (Mr. F. W. J. Belton) will give some notes on the various plant at the works.

Proposed National Gas Exhibition in Birmingham.—It is proposed to hold, in the autumn, a national gas exhibition at Bingley Hall, Birmingham, coincident with the visit to that City for its conference of the British Commercial Gas Association. Alderman Lloyd (the Chairman of the Birmingham Gas Committee) is the President of that body. The exhibition will be the first national exhibition since that held in London in 1913.

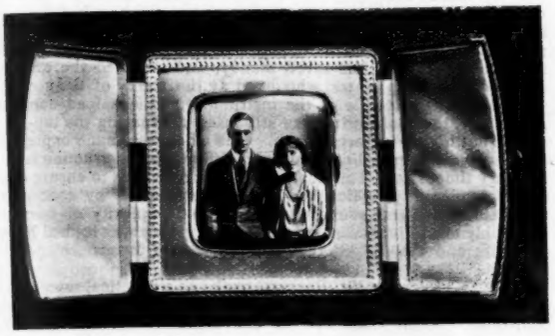
Glue-Pot Heating by Gas.—Glue heating is a skilled job, and gas has almost entirely superseded solid fuel for the purpose in skilled trades. The reasons for advocating this particular industrial use of gas—which, by the way, is growing daily—are many; but not the least important is the fact that, where gas is employed, the working temperature can be controlled and maintained without constant supervision and without waste of fuel. The current number of "A Thousand-and-One Uses for Gas" (No. 108) contains a series of photographs and much useful information on the heating of glue-pots and of cawl-plates by gas. It is published by the British Commercial Gas Association, No. 30, Grosvenor Gardens, S.W. 1.

PRESENTATION TO THE DUKE OF YORK.

British Industries Fair, Birmingham Section.

When H.R.H. the Duke of York visited the Birmingham Section of the British Industries Fair, at Castle Bromwich, on Thursday, the 22nd inst., Mr. Alderman John Henry Lloyd, the Chairman of the Gas Committee of the Birmingham Corporation, presented a gold cigarette case to His Royal Highness, on the front of which was an enamel photograph of the Duke with Lady Elizabeth Bowes-Lyon.

The reproduction of the photograph in ceramic colouring was the work of Mr. F. W. Miller, of Messrs. F. W. Miller & Co., Ltd., Birmingham, who are specialists in ceramic photography. The



photograph was reproduced on a collodion film laid on a white ground of enamel. This was fused in a gas-heated muffle, at a temperature of about 1500° Fahr., which fixed the ceramic reproduction to the white enamel base. Over the photograph a layer of finely powdered transparent glass enamel was laid which, on being fired in the gas-heated muffle, melted and formed an enamel surface, which was then polished on a high-speed felt bob. The portrait is practically indestructible.

The Duke of York expressed his admiration of the beautiful and interesting gift, and his pleasure in accepting it.

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GAS COAL CONTRACTS.

The 60 and 40 P.Ct. Clause.

THE Mining Association of Great Britain have forwarded to us the appended circular, comment upon which appears in our editorial columns to-day:

There is reason to believe that the gas companies are seeking to effect certain changes in their buying policy in respect of contracts for the forthcoming twelve months.

Under present conditions, coal is dispatched to gas-works throughout the country in regular monthly quantities. This admirable arrangement has been in force for some years past, before which time it was the practice to supply 60 p.ct. of the requisite tonnage during the six winter months and 40 p.ct. during the remaining months. Gas undertakings, on the advice of that influential body, the Gas Managers' Association, are now contemplating a reversion to this practice by the insertion of a new clause in their next contract.

Colliery undertakings which produce this type of coal on a large scale view the proposed change with much anxiety; and steps have already been taken to put their views before the Gas Managers' organization. The objections to the clause may be summarized under the following heads:

(1) Irregular deliveries of gas coal on the lines indicated would militate against the efficient and economic working of those colliery undertakings concerned, in that it would entail short-time working at a period when more and not less output is required to keep the pits working full time.

(2) To keep pits in full production, collieries supplying gas coal must work full pressure in the summer season. If the owners enter into contracts such as will keep their pits working for full time over this period, they cannot reasonably be expected to give the gas companies the required 50 p.ct. greater output and delivery in winter.

(3) The change necessitated by a relatively greater output in winter than in summer would have a direct effect upon production costs, owing to the short time worked. This would react not only upon the employment, but upon the wages of the miners.

(4) Shorter working time would entail a further depletion of the supplies of small coking coal which are so badly needed by the iron and steel and other industries. With such a shortage, prices would go up; and these great staple industries would be badly hit. Industry and, in fact, the country as a whole, would be adversely affected by a rise in prices at a time when every effort is needed to accelerate the process of trade revival.

At a recent meeting of gas-coal producers held at Leeds, Mr. A. W. Archer (who presided over the proceedings) pointed out that the financial position of the gas companies was much more favourable than that of colliery undertakings. The former were well able to accept fair and reasonable conditions for their supplies of coal. Mine owners, on the other hand, were faced with a most acute problem of making both ends meet.

It is obvious to all students of the economics of the coal trade that any movement making for the restriction of output, such as would be brought about by the gas managers' scheme, must accentuate the evil effects of the seven-hour day. As Mr. Archer pointed out, it would be wholly inconsistent on the part of coal owners to appeal to their men for an eight-hours day to increase the output of coal to a quantity adequate to the country's needs, if the gas industry sought and obtained an arrangement for unequal deliveries of coal, resulting at certain seasons in diminished output at gas coal pits.

The gas-works are, generally speaking, well provided with stocking facilities for emergency purposes; and, as the experience of the past ten years has shown, are well able to stock in summer against the heavy winter demands. It is clearly in the national interest that this method is preferable to one which involves the stoppage of pits, and loss to other industries every summer.

The views of the Yorkshire owners have already been submitted to the gas companies; and it is only to be hoped that, on reflection, the latter will realize the unwisdom of pressing their retrograde proposal.

A VISIT TO THE WORKS OF THE AUTOMATIC CONTROLLER COMPANY, LTD.

On Monday of last week several engineers and others interested in lighting visited the works of the British, Foreign, and Colonial Automatic Controller Company, Ltd., at Holdenhurst Road, Bournemouth. The visitors were conducted round the works by Mr. John Gunning (Managing Director and Secretary of the Company).

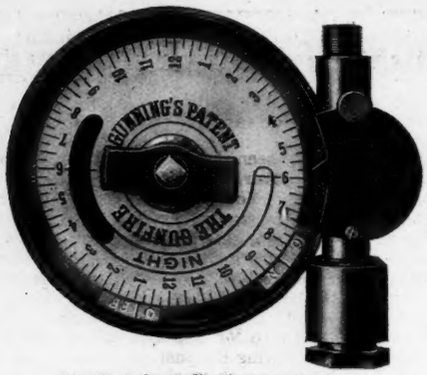
THE "GUNFIRE" WORKS.

The stamping and turning shop was the first to be inspected. Here the dust-proof cases of the controllers were seen in the making. A 40-ton press is used for this purpose, and is adjusted to suit the particular process in hand, so that the press is capable of making the cover from start to finish. Another smaller press was busily stamping-out hundreds of small gear wheels, and throughout the shop delicate milled-head screws, and various parts of the clock mechanism, were being produced in accurate and ingeniously adjusted lathes. In other departments the divers parts were being assembled, and skilled clockmakers were inserting the delicate portions of the mechanism. The visitors were able to appreciate the great care which has to be exercised. Interest was particularly shown in a small brass plate, jewelled in no less than eighteen places. Passing through the repair shops, the rigorous testing of the finished instrument was demonstrated. Every controller is proved before it is sent out of the works, not only for its main action of turning the gas-tap, but also for the accurate time-keeping of the clockwork mechanism. Finally, the stock room for the finished article was reached. Here hundreds of controllers were to be seen awaiting dispatch to various parts of the world. General approval was expressed as to the excellent organization and co-ordination of the various departments.

THE FINAL PRODUCT.

The essential feature of the finished product is the simplicity of its mechanism, which make for strength and reliability. It can be entrusted safely to the ordinary workman, and can be used with any type of burner or lantern. Each lamp is dealt with separately; and there is no dependence upon a severe uniformity of pressure. Two types are made, one being instantaneous in action, the other gradual. If in the former the quick action should by any means become inoperative, then the gradual action comes into play, and the full force of the mainspring operates an arm in contact with the spur wheel of the tap, so that its action cannot fail as long as the clock is going. These two types are modified to meet all requirements. They may be applied to the lighting of clusters at any prearranged time—extinguishing part at any desired time, and the remainder at dawn; for evening and morning lighting and extinguishing; or for hand lighting and automatic extinguishing. The plug of the tap can be instantly removed and replaced without disturbing the fitting of the burner; re-mantling can be done without opening the controller; and the by-pass, if desired, can be so adjusted that it is only in action when the lamp is extinguished. The cover, although light in construction, is dust-proof, and does not suffer from condensation, which latter is a point of no little importance.

We reproduce two illustrations of the "Gunfire" controller which show the admirable compactness of this useful instrument; and we feel sure that an extensive field exists for its further application. In particular we would emphasize its im-



Standard Controller for Street Lamps.

Controller for Pendant Lamps.

portance with regard to shop lighting both internally and externally. Tradesmen are realizing that even after business hours it is advisable to maintain their premises well-lighted, to give the working public the opportunity of seeing their various displays of goods. For this purpose, a reliable automatic controller is an essential, and already many gas companies have benefited by their use. Doubtless the future will see their extended employment.

A Luncheon.

Prior to the inspection of the works a luncheon was given in the hall of the works. Among those present may be mentioned Mr. P. G. G. Moon (Engineer and General Manager, Bournemouth Gas and Water Company); Mr. C. Crump (late Chairman of the Birmingham Corporation Lighting Committee); Mr. E. L. Burton (Secretary, Brighton and Hove Gas Company); Mr. C. Chambers (Harrow); Mr. J. Hudson (Surveyor, Ellesmere Port); Mr. W. E. Cooper (Chief Sanitary Inspector, Bournemouth); Mr. H. Keene (Bournemouth and Poole Gas Company); Mr. A. E. Pycraft (St. Pancras); Col. W. R. Thomson; Mr. G. W. Bailey; and Mr. E. H. Beney.

Councillor C. A. D. George, J.P. (Chairman of the Company), in proposing the toast of "The King," extended a hearty welcome to the visitors. In the course of a short speech, he pointed out that the "Gunfire" controller, which was manufactured at their works, was known throughout the world. They supplied America, Australia, and New Zealand, and in all cases their instruments were used with every satisfaction. It had always been their motto to employ English methods in the manufacture, which implied soundness in construction, and consequently reliability in service.

Mr. C. Crump proposed the toast of "Their Hosts, the Company." For a period of two years, he said, he was Chairman of the Lighting Committee of the City of Birmingham; and he spoke from experience when he said that the "Gunfire" Company were ever in the van of progress. The fact that no less than 10,000 of their controllers were installed in Birmingham at the present time, and were giving every satisfaction, spoke volumes. During his short period of office, he had been authorized to enter into a contract for 4000, and they recommended themselves. The present Company was first established in its new form in 1905—unfortunately to meet with a peculiar opposition, for at that time the Patent Office apparently regarded every clockwork device as a diabolical contrivance. He was pleased to say that was in the past; and he had every confidence in the future success and prosperity of the Automatic Controller Company. They were second to none, showing admirable ingenuity in their patents, and a progressive spirit.

Mr. John Gunning said that he would not hinder the proceedings by making a long speech, but would like to say how grateful he was to those present, many of whom had come considerable distances, probably at some inconvenience. Unfortunately several engineers had been unable to accept the invitation of the Company, but they had written to him expressing their full appreciation of the "Gunfire" controller. Strange and unfounded claims had been made as to who was the actual pioneer of automatic controlling devices. It would be wrong for him to state that he was the pioneer, because without the help of the engineers who had adopted his instruments, no progress could have been made. Let it be said rather that the pioneering was shared. Although several attempts to make an apparatus for the control of street lamps had been made prior to 1897, no appliance had been found which was of any real practical value, until in this year he took out his first patent. After experiencing many difficulties, a small company was formed in 1898 to place the instrument on the market. It was not until 1902 that it began to be known and used. During this year a paper describing the "Gunning" apparatus was read before the Incorporated Gas Institute. The present Company was formed in 1905. During the war, owing to lighting restrictions, their rents for instruments on hire were reduced by thousands of pounds per annum; but they had now more than regained the pre-war amount, and had not lost a single customer. The manufacture of automatic controllers was a great industry, and he made just claim that his was a live firm. It was significant that in England alone 200,000 "Gunfire" controllers were in use at the present time. The system of hire had been practised for twenty years, and no installation had been returned. These results had been obtained simply upon the merits of the "Gunfire" instrument. Controllers saved money, and obviated the unpleasant duties of the lamplighter, who lived at the mercy of the god of the weather. The principle of the instrument had remained unchanged. As at first, the mainspring was still used for turning the tap—a very simple but highly important item. The clock was made expressly for the purpose of controlling a tap, and differed in construction from the ordinary timepiece. The aim of the Company was to ensure a maximum of reliability, which had been accomplished by concentrating upon simplicity and sound engineering. Complexity of mechanism invariably meant increased trouble. Their policy was to deal honestly with all; and they hoped that fair play would in turn be meted out to them.

Mr. A. E. Pycraft (St. Pancras) spoke as a practical man who had solved a certain phase of labour trouble by the use of the "Gunfire" controller. Some years ago, in conversation with Mr. Walter R. Locke, the Borough and Water Engineer of Hemel Hempstead, he was informed that the automatic system of control had been adopted there. It was interesting to learn that at the present time no lamps in this district were lighted in any other way than by means of "Gunfire" controllers. He was pleased to add his testimony to swell the mass of favourable report. By converting 1500 lamps in the St. Pancras area to automatic control, he had effected a saving of no less than £900 per annum; and in the near future he hoped to save more than this—perhaps £1500. He was surprised that automatic control had not met with more general adoption. The "Gunfire" control was perfectly safe and reliable in its action.

Councillor H. J. Thwaites (Chairman of the Bournemouth Lighting Committee) remarked that the "Gunfire" controller had been used with satisfaction in Bournemouth for eighteen years, a simple fact which amply proved its reliability. He would suggest that the Company had not advertised sufficiently; but with regard to their continued success he had no fears. It was certain that in Bournemouth there was no wish to change their method of control.

SCOTTISH JUNIORS AT BONNYBRIDGE.

The Scottish Junior Gas Association (Western District) paid a visit on Saturday last to Messrs. John G. Stein & Co., Ltd., silica and firebrick manufacturers, Bonnybridge, and were conducted over the extensive works by Mr. J. Stein. The productive capacity of the works is over a million firebricks a week. The members of the Association were shown the various processes in the manufacture of the many sections of retort firebrick and silica which the Company produce. Everything was explained, from the raising of clay from the mine to the turning-out of the final product.

Great admiration was expressed for the up-to-date machinery of the Company, and the lay-out and tidiness of the works. Messrs. Stein had very considerately retained a number of their employees at work, so that the members had the privilege of seeing the actual process of manufacture. Each operation was fully demonstrated by the very competent staff.

Tea was served in a large room used by the workers as a recreation hall. Here Mr. Stein welcomed the visitors, and expressed pleasure at being able to afford the Association the opportunity of seeing over the works. The members expressed their thanks. Altogether a most enjoyable and instructive afternoon was spent.

Midland Junior Gas Association.—At a meeting of the Association to-morrow (Thursday) evening, in the Council House, Birmingham, Dr. Harold Hartley, Chief Chemist to Radiation, Ltd., will read a paper on "Developments in Gas Appliances." A visit to the works of Messrs. Gibbons Bros., Ltd., has been arranged for Saturday afternoon, April 14.

Midland Association of Gas Engineers and Managers.—We learn from the Hon. Secretary of the above association that the Annual General Meeting will be held at the Grand Hotel, Birmingham, on Thursday, March 8, when the President, Mr. W. H. Adams (Bilston) will give his address. This will be followed by a paper on "Organization," by Mr. F. C. Briggs (Dudley). Among the miscellaneous items will be a report of the Commercial Association and a discussion regarding the suggested National Gas Exhibition, Birmingham. We notice from the report of the committee that eight new members have been elected during the year. The committee also regret to report the death of Mr. J. S. Lucking (Witney).

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Fifty-Third Annual Meeting.

The Fifty-Third Annual Meeting of the Manchester District Institution of Gas Engineers was held on Saturday last, at the Midland Hotel, Manchester. There was a large attendance. The proceedings began with a luncheon, the retiring President (Mr. Harold Davies, of Chesterfield) being in the chair, supported by the President-Elect (Mr. R. E. Gibson, of Liverpool), Mr. S. Tagg (Preston), Mr. G. S. Frith (Runcorn), and Mr. Wm. Rogerson (of Middleton), the Hon. Secretary.

BUSINESS MEETING.

Mr. DAVIES occupied the chair at the business meeting.

NEW MEMBERS.

The following new members were introduced and welcomed: Mr. John Edwin Triggs (Penistone); and Mr. Albert Cecil Taylor (Royston, Yorks).

ANNUAL REPORT AND ACCOUNTS.

The annual report and statement of accounts were next submitted. The membership stands at 202, a decrease of two. Regret was expressed at the deaths of Mr. Francis Barratt (Ramsbottom) and Mr. W. T. Buckland (Chesterfield), and the meeting appropriately signified its sympathy with their relatives. The accounts showed a credit balance of £22 2s. 5d.

On the motion of Mr. WM. HILL (Stalybridge), seconded by Mr. W. J. SMITH (Bolton), the report and financial statement were approved.

COMMERCIAL SECTIONS.

The annual reports of the Commercial Sections were presented—that for Yorkshire by Mr. J. E. LISTER COOPER, of Yeadon (Secretary and Treasurer of the Yorkshire Section), and that for Lancashire by Mr. W. J. SMITH, of Bolton, in the absence of Mr. S. Meunier, of Stockport.

These reports were accepted with thanks; the Chairman remarking that the activities witnessed therein had been of immense benefit to the gas industry, and formed another proof of the desirability of every member of the Institution being attached to one of the Commercial Sections.

THE INSTITUTION'S VISIT TO BELFAST.

Mr. S. TAGG, at this stage, intervened with a statement regarding the proposed visit of the Institution of Gas Engineers to Belfast, for the annual meeting in June next. The visit, he said, coincides with the centenary of the gas undertaking in Belfast, now the centre of the Ulster Government; and the Committee of the Institution and Mr. J. D. Smith, the President, were very desirous of receiving a visit from the English gas associations. Of course, a doubt in some minds was whether the conditions in the Northern Capital would be sufficiently quiet to induce English engineers to undertake the journey and to take their wives; but Mr. Smith assured him, and all whom it concerned, that he believed Belfast to be as safe as any English town. He also gave the assurance that his Committee were going to offer a very wide hospitality, and would do all in their power to make the visit acceptable. Mr. Tagg hoped the members of the Manchester District Institution would accept Mr. Smith's assurance and attend the Belfast meeting in large numbers. At luncheon he had an opportunity of talking with a man who goes to Belfast every two or three weeks, and he was assured that in Belfast the amenities of life at the present time were like those of any English town, and that everything was quite as safe.

MISCELLANEOUS.

On the motion of Mr. W. WHATMOUGH (Heywood), seconded by Mr. W. J. SMITH (Bolton), it was agreed to give £5 5s. to the Benevolent Fund of the Institution of Gas Engineers.

On the motion of Mr. H. KENDRICK (Manchester), seconded by Mr. G. S. FRITH (Runcorn), Mr. Harold Davies (Chesterfield) was appointed the representative of the Manchester Institution on the Council of the Institution of Gas Engineers for 1923-24. Mr. Kendrick said he was certain Mr. Davies would make an efficient representative and carry on the good work of the Institution's representatives in the past. Mr. Frith remarked that they must look to having Mr. Davies as their representative for three years, for it was no use sending a representative for one year. Everyone who had been on the Council would agree with this statement.

It was next agreed, on the proposal of Mr. A. E. MOTTRAM (Ossett), seconded by Mr. W. HILL (Stalybridge), that Messrs. W. Buckley (Manchester) and Mr. F. H. Robinson (Harrogate) be the representatives of the Institution on the Councils of the Manchester District and the Yorkshire Junior Associations respectively.

INDUCTION OF THE PRESIDENT.

"Our next business," said Mr. DAVIES, "is the induction of Mr. R. E. Gibson as our new President. The past year has been a quiet and a happy one. I think that, perhaps, from a literary point of view, our efforts have not been great. But we have had several very interesting and instructive visits. The duties of President have not been heavy, and it has been a great pleasure to be in the chair. No words of mine are needed to introduce Mr. Gibson. You know him and you appreciate his qualities; and I am sure you will all be benefited by his knowledge and experience, and, probably, by an opportunity of inspecting something that we shall all wish to see at Liverpool. I ask him to take the position to which you have so cordially and unanimously elected him." [Applause.]

Mr. GIBSON, having taken the chair, moved that the best thanks of the assembly be given to Mr. Harold Davies, the retiring President, for his services during the past year. This was seconded by Mr. S. TAGG (Preston), each speaker testifying in unequivocal terms to the value of Mr. Davies' services as President, and to the high esteem in which he was held by his fellow-members.

The resolution was passed with acclamation, and Mr. DAVIES briefly acknowledged the compliment.

The PRESIDENT then delivered the following

PRESIDENTIAL ADDRESS.

Gentlemen,—Before proceeding to deliver my address, I desire to thank you sincerely for the honour you have conferred upon me in electing me your President for this year. I appreciate the honour very greatly, and will use my best endeavours to uphold the dignity of the office and carry on the high traditions handed down by a long line of able and distinguished predecessors.

The preparation of a presidential address becomes more difficult with each passing year—it is almost inevitable that much old ground must be traversed on these occasions. In this address, I propose to deal with some aspects of our industry which are to the fore at the present time.

REDUCTION OF QUALITY.

It is probably within the knowledge of the members of this Institution that in pre-war days the Company I have the honour to serve was noted as one of the few undertakings sending out really rich gas, having an illuminating power of 20 candles in a flat-flame burner and yielding a gross calorific value of 685 B.Th.U.

My predecessor, the late Mr. Edward Allen, in his paper read before this Institution in February, 1907, advocated gas of high quality, and made reference to the "disc of burnished gold" in terms of the highest praise. If anyone at that time had been bold enough to prophesy that the Liverpool Company would, within a short period of time, be sending out gas of 475 B.Th.U., he would not have been believed. Where are we to-day? By the Company's Act of 1914, a calorific standard was set up, and the quality agreed upon was 550 B.Th.U. gross. By sheer force of circumstances and not by choice, the quality was further reduced during the war to 475 B.Th.U. (and to a still lower quality in times of great emergency).

TABLES AND DIAGRAMS.

It occurred to me that I could not do better than give you the result of my investigations as to the effect of so great a reduction in quality. With this object in view, tables and diagrams have been prepared showing the consumption of gas, calorific value, &c., at Liverpool during the last decade (from 1911-12 to 1922).

DIAGRAM 1 shows graphically the fall in calorific value, the variation in the total volume of gas sold and in the total therms sold each year.

TABLE "A" gives the same information in figures, variations being expressed as percentages of 1911-12 figures.

DIAGRAM 2 shows the variation in the gas sold during the period to ordinary and prepayment consumers, expressed in cubic feet and in actual therms.

TABLE "B" gives the same information in figures.

DIAGRAM 3 gives the variation in the average quantity of gas sold to each ordinary and prepayment consumer, expressed in cubic feet and in therms (actual).

TABLE "C" gives the same information in figures.

DIAGRAM 4 shows the average quantity of gas, expressed in volume and in therms, supplied to each ordinary and prepayment consumer in 1911-12 and in 1922, also the volume of gas which would be equivalent in heat-content to that supplied in 1911-12, but in 1922 quality—viz., 490·13 B.Th.U. instead of 620·37 B.Th.U.

TABLE "D" gives the same information in figures, the variations being expressed in percentage.

EFFECT OF REDUCED QUALITY.

From the information gathered, it was found that it would be futile to attempt to dogmatize with any degree of certainty as to the effect of reduced quality. On the surface, it appeared that there had been no real increase in business, because increase in consumption on the volumetric basis had synchronized with a corresponding decrease in calorific value, apparently giving support to the view that one therm is as good as another whatever the quality, or, in other words, giving confirmation to the principle that if the calorific power were halved, the volume would be exactly doubled.

What was the real meaning of these figures? Had our business been standing still? Had we been marking time? One

could scarcely credit such a state of things; and yet, on the face of it, this appeared at first to be the case.

More careful analysis of the figures, however, showed that no such definite deduction could be made. On closer examination it was found that while the total volumetric consumption had increased approximately in inverse ratio to the fall in calorific value, this was by no means the case when the sales through ordinary meters and prepayment meters were considered separately. The increase in the former was much below that standard, while the increase in the latter was very far above it. Furthermore, the average consumption per prepayment consumer had increased enormously, and far more than could be accounted for by the decrease in quality. Over the same period, however, the ordinary consumer had increased his average consumption by only 5 p.ct., which is considerably less than could be accounted for by the reduction in quality. A certain amount of increased consumption would, of course, be brought about by the fall in quality in both classes, but to what extent it is impossible to say; there being so many factors to be taken into account—*e.g.*, nipple adjustment or non-adjustment, variation in pressure, variation of specific gravity, flame contact, flame temperature, use to which the gas is put, &c. It should be borne in mind that in some cases the quantity of gas consumed depends mainly on the period of time the gas is left burning, while in others—*e.g.*, gas-engines and gas-heated water-boilers—the number of heat units required is the controlling factor.

If a consumer wishes to boil a certain quantity of water, assuming the same efficiency for either quality, 600 B.Th.U. gas

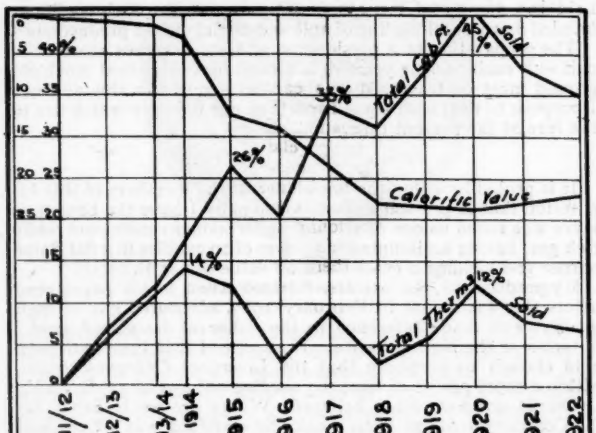


Diagram 1.

TABLE A.

Year.	Calorific Value.		Total Gas Sold (Cubic Feet).		Total Gas Sold (Therms).	
	B.Th.U.	Decrease	Millions	Variation.	Thousands.	Variation.
		P.Ct.		P.Ct.		P.Ct.
1911–12 . . .	620·37	—	4516	—	28,019	—
1912–13 . . .	618·62	0·3	4827	7	29,858	6
1913–14 . . .	613·08	1·1	5062	12	31,036	11
Half year 1914 .	605·84	2·3	2636	17	15,971	14
1915	548·67	11·5	5694	26	31,239	12
1916	530·49	12·9	5422	20	28,765	3
1917	505·52	18·5	6023	33	30,447	9
1918	484·11	22·0	5945	31	28,781	3
1919	480·63	22·5	6206	37	29,826	6
1920	478·84	22·8	6528	45	31,260	12
1921	484·88	21·8	6266	38	30,381	8
1922	490 13	21·0	6098	35	29,886	7

would boil the water with half the consumption which would be required in the case of 300 B.Th.U. gas. On the other hand, if a gas-fire, in full use during the winter, were burning ten or eleven hours per day, assuming that there were no alteration of the nipple or of density, the gas consumption in cubic feet would be about the same, whether the quality were 600 or 300 B.Th.U.

Thus in the one case the consumption would be doubled, but in the other case there would be no increase. Between these two extreme cases there are a host of intermediate positions. It is therefore impossible to say exactly to what extent the general consumption would be affected. All that can be said is that the consumption, expressed in cubic feet, would be increased to a certain extent by the reduction in quality; but this would be counteracted by any increase in efficiency that there might be, due to the use of lower quality. It would also be affected largely by the fact that in most cases no alteration of nipple orifice would have been made.

TREND OF NEW BUSINESS.

The tables and diagrams, however, are very useful in showing the trend of extension of business, and disclose some remarkable facts. It will be seen from Diagram 2 that the total consumption of gas, in cubic feet, by ordinary consumers, reached the highest point in the year 1917, when it was 23 p.ct. more than in the year 1911-12. The consumption by prepayment consumers, however, had increased by no less than 164 p.ct. in 1921, falling since then to 148 p.ct. in 1922. (See Table B.)

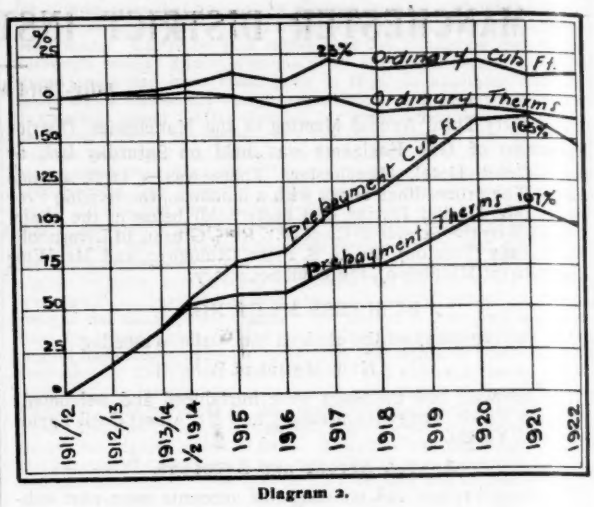


Diagram 2.

TABLE B.

Year.	Gas Sold to Ordinary Consumers.				Gas Sold to Prepayment Consumers.			
	Cubic Feet (Millions).	Variation.	Therms (Thousands).	Variation.	Cubic Feet (Millions).	Variation.	Therms (Thousands).	Variation.
		P.Ct.		P.Ct.		P.Ct.		P.Ct.
1911–12 . . .	3439	—	21,335	—	817	—	5,068	—
1912–13 . . .	3596	4	22,247	+ 4	971	19	6,008	18
1913–14 . . .	3658	6	22,429	+ 5	1141	39	6,993	38
Half year 1914 .	1847	7	11,189	+ 5	648	59	3,925	55
1915	3998	16	21,935	+ 3	1464	79	8,030	58
1916	3834	11	20,341	− 5	1501	84	7,960	57
1917	4237	23	21,418	—	1712	109	8,653	71
1918	4064	18	19,676	− 8	1807	121	8,749	72
1919	4111	19	19,760	− 7	1964	140	9,442	86
1920	4183	22	20,028	− 6	2147	163	10,280	103
1921	3921	14	19,012	−11	2164	165	10,494	107
1922	3844	12	18,842	−12	2023	148	9,915	96

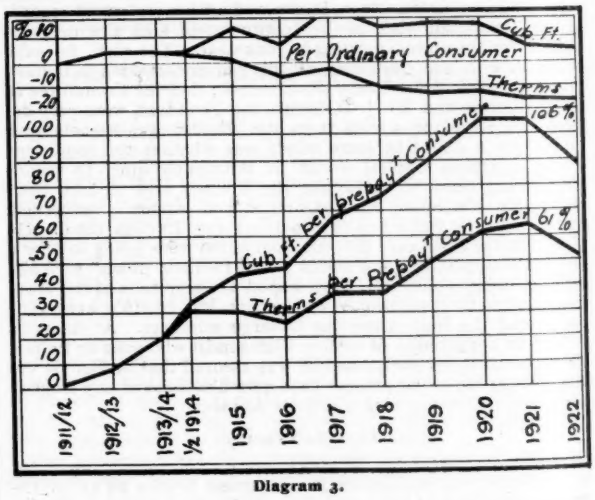


Diagram 3.

TABLE C.

Year.	Gas Sold. Average per Ordinary Consumer.				Gas Sold. Average per Prepayment Consumer.			
	Cubic Feet.	Variation.	Th'ms.	Variation.	Cubic Feet.	Variation.	Th'ms.	Variation.
		P.Ct.		P.Ct.		P.Ct.		P.Ct.
1911-12 . . .	44,448	—	275	—	11,199	—	69	—
1912–13 . . .	46,846	5	289	+ 5	12,223	9	75	8
1913–14 . . .	46,872	5	287	+ 5	13,434	20	82	18
Half year 1914 .	47,138	5	285	+ 4	14,887	33	90	30
1915	50,629	14	277	+ 1	16,203	45	89	29
1916	48,726	9	258	− 6	16,349	46	86	25
1917	53,705	21	271	− 1	18,551	66	93	35
1918	51,318	15	248	−10	19,562	75	94	35
1919	50,914	14	244	−11	21,303	90	102	48
1920	51,165	15	245	−11	23,120	106	110	59
1921	47,589	7	230	−16	23,007	105	111	61
1922	46,606	5	228	−17	20,988	87	103	49

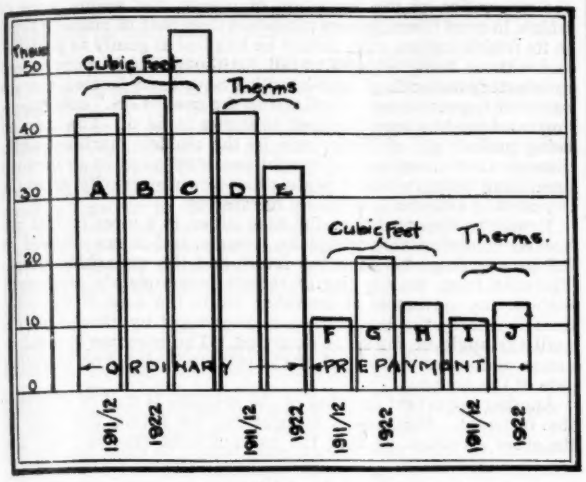


Diagram 4.

TABLE D.

—	Gas Sold per Ordinary Consumer.			Gas Sold per Prepayment Consumer.		
	Volume Basis.	Heat Basis.	Volume at 1922 Quality Equivalent to Therms Supplied in 1911-12	Volume Basis.	Heat Basis.	Volume at 1922 Quality Equivalent to Therms Supplied in 1911-12.
	C.Ft.	Therms.	C.Ft.	C.Ft.	Therms.	C.Ft.
Year 1911-12 .	44,448	275	56,122	11,199	69	14,170
,, 1922 . .	46,606	228	—	20,988	103	—
Difference . .	2,158	− 47	− 9,516	9,789	34	6,818
,, p.ct.	5 p.ct.	−17 p.ct	− 17 p.ct.	87 p.ct	49 p.ct.	49 p.ct.

The diagram also shows the total consumption, expressed in therms, of ordinary and prepayment consumers. It will be seen that the line representing the ordinary consumption in therms falls considerably, and, instead of showing an increase in 1922 of 12 p.ct., as when expressed in cubic feet, there is a decrease of 12 p.ct. when compared with the consumption in 1911-12. The therm line for the prepayment consumption, however, shows a steady increase, reaching 107 p.ct. in 1921. This enormous increase of consumption by the smaller consumer is significant, and may possibly be attributable to the high rates of wages which have prevailed during and since the war, enabling the small consumer to spend more on heating, cooking, and lighting than he was accustomed to in pre-war days.

A better indication of the trend of new business may be obtained if the average consumption per consumer is considered. For this purpose Diagram 3 has been prepared. The highest point reached by the ordinary consumer was in 1917, when the increase by volume was 21 p.ct. over the consumption in 1911-12, falling to only 5 p.ct. in 1922; whereas the greatest increase in the consumption by the prepayment consumer was reached in 1920, being 106 p.ct. more than in 1911-12, and falling to 87 p.ct. in 1922. A comparison of the consumption per consumer is shown on Diagram 4, both on the volume and the therm basis. Columns "C" and "H" show the quantities of gas, per ordinary and prepayment consumer respectively, that should have been consumed in 1922, to be equal in thermal content to the corresponding quantities consumed in 1911-12.

The diagram brings to light the strange fact that for some reason or other the consumption in heat units per consumer has been much less than might have been expected in the case of the ordinary consumer, but much more in the case of the prepayment consumer. Does this not indicate that the larger consumer has learnt the lesson of economy during the war, while, on the other hand, the smaller consumer, receiving higher wages, has been able to afford an improved standard of comfort; or can the decrease in the case of the ordinary consumer be attributed to improved efficiency on account of lower quality? If so, why is it not shown in the case of the prepayment consumer? The enormously increased demand for gas by the prepayment consumer clearly shows that there is a large field for development in this direction. It is evident that the working man appreciates the comfort and convenience to be derived from the domestic use of gas. He should be encouraged and catered for in every possible way by the offer to him of efficient gas appliances at the lowest possible cost.

BURNERS AND FITTINGS.

With regard to the lighting business, we have a keen competitor in electricity, and it is of the utmost importance that the most efficient burners should be used, special care being taken to ensure correct adjustment and maintenance. Inferior and inefficient burners, cheap and shoddy fittings, and poor mantles will only help our competitors.

CONSUMERS NOT AFFECTED BY REDUCTION.

Diagram 1 shows the considerable reduction that has taken place in the calorific value of Liverpool gas since 1911-12. This great reduction has been effected without causing any serious trouble, and our experience has shown that a considerable lowering of quality, such as that which has taken place, can be made gradually without any inconvenience to the consumers generally.

PRODUCTION OF THE THERM.

Under the new regulations set up by the Gas Regulation Act, 1920, there are two questions which must engage our attention:

(1) How to make the therm in the cheapest possible way, and

(2) What quality should be declared.

The latter will depend on the former.

In arriving at a decision on this vital matter, it is advisable to take as long a view of the situation as possible, and not be guided by the immediate present. Frequent changes of quality are undesirable, involving adjustment of burners and arousing possible suspicion in the mind of the consumer. Having looked as far ahead as possible, with special regard to the trend in prices of raw materials and residuals, and bearing in mind the type of plant available and in contemplation, it should be possible to arrive at an estimate of the cost of various qualities of gas; but consideration should also be given to the condition of the distributing system. If the mains and services are already too small for their work, declaration of a higher quality will ease the situation. If, on the other hand, cheaper gas per therm can be produced by lowering the quality, a compromise will probably result.

Much depends on the type of manufacturing plant already available. Straight coal gas in horizontal retorts will be comparatively high in quality and will in many cases be the cheapest per therm. This fairly rich gas may be mixed with lightly-carburetted water gas or blue water gas, or sent out without any admixture. Vertical-retort gas can apparently be made more cheaply at a lower quality. Then there are the various systems of complete or partial gasification, coke-ovens, and low-temperature carbonization, all advancing claims for consideration. The circumstances and the requirements of each case must be the deciding factor. All things considered, I am of opinion, speaking generally, that the production of a moderately high quality—say, 500 to 550 B.Th.U.—will be found the most convenient to distribute, and the most serviceable to the consumer. I am aware that this subject is one on which there are great differences of opinion, and one cannot dogmatize, in view of the many conflicting results (in some cases evidently erroneous) that are published.

CHARGING BY THE THERM.

Since the passing of the Gas Regulation Act, there has been a good deal of criticism—mainly by the Press—of the so-called thermal method of charging for gas, resulting in the appointment of a Board of Trade Committee to inquire into the matter. It is easy to be wise after the event, but one can now see that the agitation might have been avoided if the old method of charging by cubic feet had been retained. Gas is actually measured in cubic feet of a certain declared quality. The thermal content can only be arrived at by calculation, and is of little use to the consumer. The price per therm, however, is useful for purposes of comparison with the charges in other towns. Until a meter is invented which will measure the actual heat units consumed, we must of necessity fall back on the volumetric measurement of gas, and shall probably have to wait a very long time before actual heat measurement is possible.

Mr. H. C. Honey, of the Board of Trade, in his evidence at the therm inquiry, said that the principle of charging by the therm was the keynote of the Gas Regulation Act—and rightly so, as it provides a standard which can be fairly applied to all undertakings alike. If gas were charged for on the volumetric basis, however, with a declared quality, the intentions of the Gas Regulation Act would still be fulfilled. All that is needed is a statement or, better still, a conversion table printed on the gas bill enabling any consumer at once to see what his consumption in therms is, if he so requires, for comparative purposes.

The present method of converting cubic feet to therms and then converting therms to money means a good deal of extra work, and appears to be unnecessary. The volumetric method is simpler and more readily understood by the consumer, and, after all, he is not paying for the actual therms he receives but for so many cubic feet of gas of a declared quality.

NAPHTHALENE.

Efficient service to the consumer involves an uninterrupted supply of gas of even quality and pressure at all times. While quality and pressure can usually be kept fairly uniform, interruption of supply is still caused in many places by the bugbear naphthalene. At Liverpool, owing to the lowering of quality during the war and to the partial discontinuance of the use of gas-oil for enrichment, naphthalene trouble, unknown in the days of rich gas, made its unwelcome appearance, and reached the highest point in 1917, when the number of stoppages during the year was 136 per 1000 consumers. Various steps have been taken to deal with the trouble—viz.:

(*a*) Extraction of naphthalene at the works by washing with a suitable absorbing oil.

(*b*) Vaporizing suitable oil by steam, and passing it in at the inlet and outlet of the gasholders.

(*c*) Spraying paraffin oil into the mains at the outlets of governors by means of atomizers.

The result has been that the number of stoppages has steadily fallen, as will be seen from Diagram 5 and Table E, which show the number of naphthalene stoppages per 1000 consumers; the calorific value of the gas; the quantity of oil used in the carburetted water-gas plant and in washing, vaporizing, and spraying.

Our experience has proved that while the vaporizing and spraying processes are palliatives, they cannot be depended upon to give complete immunity from the evil, and it is evident that the only complete cure is the entire eradication of this troublesome constituent by washing the gas thoroughly before it leaves the works. The results of washing so far give assurance that complete elimination can be effected at small cost when the necessary plant

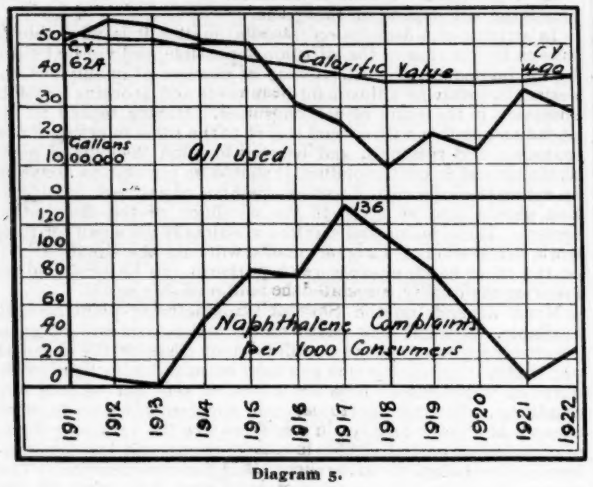


Diagram 5.

TABLE E.

Year.	Calorific Value.	Gas Oil Used.	Oil Used in Vaporizing, Spraying, &c.	Number of Complaints per 1000 Consumers.
	B.Th.U.	Gallons.		
1911 .	624	5,066,608	—	12·27
1912 .	617	5,828,517	—	4·71
1913 .	620	5,679,868	—	1·75
1914 .	594	5,219,830	—	50·24
1915 .	549	5,015,087	—	86 4
1916 .	530	3,098,987	23,626	83·06
1917 .	506	2,393,029	119,968	136·05
1918 .	484	915,098	118,126	108·92
1919 .	481	1,992,370	68,088	84·81
1920 .	479	1,508,803	57,091	45·72
1921 .	478	3,421,857	43,808	7·13
1922 .	490	2,824,877	74,298	27·82

has been installed. When complete elimination in manufacture has been achieved, there will still be the naphthalene in the plant and distributing system to be disposed of in time by means of the vaporizing and spraying processes.

COKE.

Reference will now be made to our most important, but often neglected, residual, coke. As the receipts from the sale of coke have a marked effect on the price of gas, anything that can be done to improve its physical condition, and thereby its value, is worthy of consideration. This matter has received a certain amount of attention at Liverpool during the last few years. Various systems of dealing with hot coke have been tried, and many experiments have been made, more especially with coke from horizontal retorts.

At Garston, an experimental plant has been installed for producing dry-quenched coke, the outcome of experience gained by a previous experiment at Linacre. The coke produced is of excellent appearance and quality. Tests on boilers and water-gas plant show an improved fuel value of 22 p.ct. The plant has been working continuously since October last, and has demonstrated that the system would be quite practicable on a larger scale provided that the cost of the plant can be kept within reasonable limits. Modifications in the design, however, would be necessary to ensure that the containers are entirely self-discharging. Table F shows a comparison of ordinary and dry-quenched coke. It will be seen that the latter is 22·7 p.ct. better in fuel value than the former.

TABLE F.

Description.	Combustible Matter.	Moisture.	Ash.	Calorific Value.	Effective Calorific Value.
	P.Ct.	P.Ct.	P.Ct.	B.Th.U.	B.Th.U.
Ordinary coke. . .	73	17	10	10,694	10,504
Dry quenched coke .	88	0	12	12,892	12,892
Improved value, p.ct.	20·5	—	—	20·5	22·7

An important matter in connection with the handling of coke is the prevention of the formation of breeze, the selling price of which, in most towns, is very much less than that of coke. Owing to its friable nature, coke should be handled as gently as possible, and without being allowed to fall. Although many more or less satisfactory methods of coke-handling have been devised, there is room for improvement. At Garston the new "G.N." coke-handling machine has been installed, as shown in fig. 6. The coke, on being pushed out of the retorts by the stoking machine, slides through an enclosed tube of special construction on to an inclined quenching bench, where it again slides down by gravity, on to the dry-cooling chamber previously referred to.

It will be observed that the coke slides, in a more or less unbroken condition, throughout its journey, and is not allowed to fall at any point between the retort and the quenching bench. The coke from the top tier of retorts is completely discharged without any movement of the tube; but in the case of the other tiers of retorts, the last portion is discharged by tilting the tube until the angle of repose is exceeded. The machine is rapid in action and keeps well ahead of the stoking machine on the other side of the bench.

Another important function of the machine is that of charging the furnaces. Mechanism is provided for tilting the tube in the other direction, so that the red-hot coke received into the

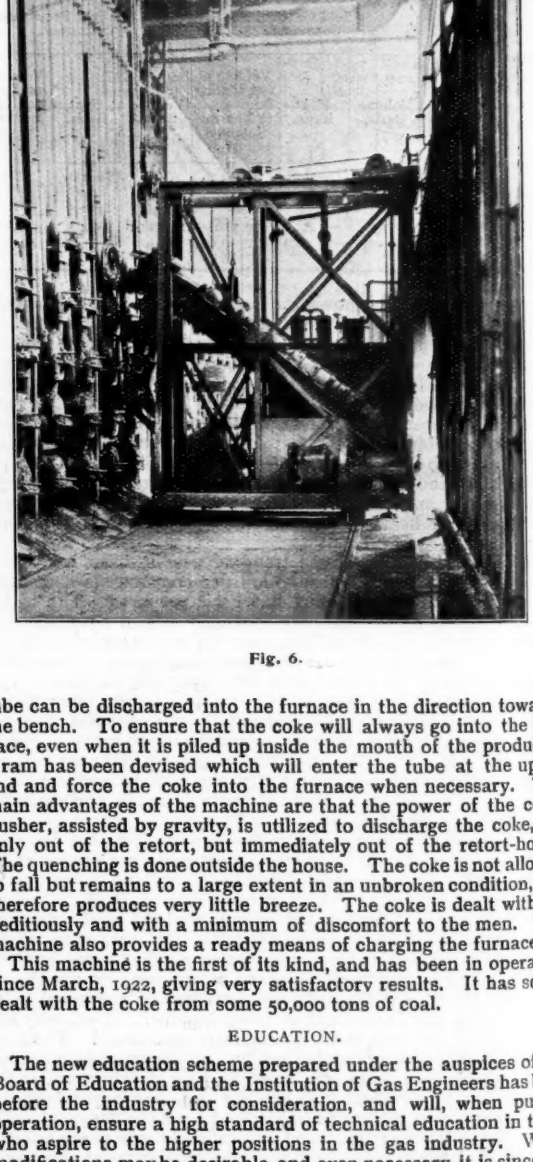


Fig. 6.

tube can be discharged into the furnace in the direction towards the bench. To ensure that the coke will always go into the furnace, even when it is piled up inside the mouth of the producer, a ram has been devised which will enter the tube at the upper end and force the coke into the furnace when necessary. The main advantages of the machine are that the power of the coke-pusher, assisted by gravity, is utilized to discharge the coke, not only out of the retort, but immediately out of the retort-house. The quenching is done outside the house. The coke is not allowed to fall but remains to a large extent in an unbroken condition, and therefore produces very little breeze. The coke is dealt with expeditiously and with a minimum of discomfort to the men. The machine also provides a ready means of charging the furnaces.

This machine is the first of its kind, and has been in operation since March, 1922, giving very satisfactory results. It has so far dealt with the coke from some 50,000 tons of coal.

EDUCATION.

The new education scheme prepared under the auspices of the Board of Education and the Institution of Gas Engineers has been before the industry for consideration, and will, when put in operation, ensure a high standard of technical education in those who aspire to the higher positions in the gas industry. While modifications may be desirable, and even necessary, it is sincerely to be hoped that any differences in details will not stand in the way of the fulfilment of the scheme, and that it will receive the whole-hearted support of our members.

The need for a higher standard of scientific attainment has long been felt, and this step in its accomplishment augurs well for the industry in the days to come. There is no doubt that the leavening influence of University training (mainly at Leeds) has already made itself felt and will continue to do so more and more;

while the good work being done by the Junior Gas Associations should also be mentioned in this connection.

ORGANIZATION IN THE GAS INDUSTRY.

Circumstances brought about by the war rendered thorough organization of the industry necessary, and the need to-day appears to be as great as ever. Recent history has shown that many powerful interests are ranged against us. In some quarters there is opposition of a very insidious nature. We can only successfully combat such opposition by organizing our forces and standing together in defence of the interests we have at heart. The organizations now in existence can only be made effective in the future to the extent that they receive the whole-hearted support of everyone concerned. It is therefore urged that all gas undertakings and their leading officials should give their loyal support.

THE PRESIDENT THANKED.

Mr. J. H. BREARLEY (Southport) moved a vote of thanks to the President for his extremely interesting and highly suggestive address. Mr. Gibson had delivered it in an ideal manner. The address was also ideal in not being too long; but its comparative shortness was no measure of its value to the Institution. Mr. Gibson had dealt in a charming manner with some of the most vital questions of the industry. Everyone was wondering what quality of gas he should declare. Some had already declared, but were not too sure that their declaration was the right one. All this was in the melting-pot. But the most valuable part of the address was the analysis it gave of the output of gas, not merely by the cubic foot, but by the therm.

Mr. F. ROBINSON (Harrogate) seconded the motion, which was accepted with cheers.

The PRESIDENT, after acknowledging the vote, said he had the authority of the Chairman and Directors of the Liverpool Gas Company to invite the Institution to hold their next meeting at Liverpool. The date provisionally fixed was May 11. He hoped the members would turn up in large numbers.

LIGHTING AND BURNERS.

Mr. F. V. BARNES, of Todmorden, then read a paper on the subject of "Lighting and Burners," illustrating his remarks by many practical examples. [We are forced by extreme pressure to hold over this valuable contribution until next week; but readers are referred to the editorial notice of the paper in this issue.]

THE ASSOCIATION OF TAR DISTILLERS.

Annual Dinner.

A cheerful party, representative of the Association of Tar Distillers, gathered at the Hotel Russell yesterday week under the chairmanship of their President, Mr. S. A. Sadler. The occasion was the annual dinner, on the arrangements for which the Secretary, Mr. W. J. V. Woolcock, is to be heartily congratulated. The guest of the evening was to have been Sir Henry Maybury, K.C.M.G., of the Roads Department of the Ministry of Transport; but he was unfortunately prevented from attending. A most important link in the co-operative chain, however, was preserved by the presence of several well-known county surveyors; and the gas industry was there in the person of Dr. Charles Carpenter.

Our readers may be reminded that the Association of Tar Distillers was founded some thirty-eight years ago, with the object of promoting the interests of the tar trade; but the services of the trade in war and in peace are of wider significance—the welfare of the nation. In war-time the manufacture of explosives was a whole-time job for the tar distillers; and as an example of the Association's peace activities may be taken their share in the framing of the new Specification for Road Tar, which was reviewed in our columns last week. The present crisis in Europe gives perhaps the most striking illustration of the vital importance of tar to the nation's trade. France has banned the export of tar from the Ruhr to the German dye factories. British manufactures worth some two hundred millions sterling a year depend for their existence on dyestuffs made from tar; and were it not for British tar distillers, this great volume of trade would, with the present European situation, be drifting to a standstill.

The keynote of the gathering at the Hotel Russell was undoubtedly co-operation. As Mr. Sadler remarked in his speech, time was when the casual meeting of a distiller and a merchant was sufficient to create the distrust and enmity of other members of the trade; but nowadays all seek to work together for the common good—a trait which luckily is more and more pervading every industry, as we who are concerned with gas know well. At this dinner not only were there road authorities and an august member of the gas industry in this country, but a leader of the American tar industry in the person of Mr. W. N. M'Ilravy, of the Barrett Manufacturing Company. The latter deal with as much as 200,000 gallons of tar a day. In the course of the after-dinner speeches several references were made to the recent action of the South Wales Patent Fuel Manufacturers' Association in seeking to obtain Government control of the price and supply of coal-tar pitch. It seems that their quandary is due primarily to the shutting-down of coke-ovens owing to general industrial depression; and with the rest of the community they must hope for the better times promised.

Due honour having been paid "The King,"

Dr. CHARLES CARPENTER, C.B.E., M.Inst.C.E., F.C.S., rose to propose the toast "Roads." He compared the roads of to-day with those he remembered in his youth, and with the surface of which the early pioneers of motoring had had to contend in their steam carriages with coke-fired flash boilers. In those days the only piece of road in London fit for a "motor" trial was a stretch near the Old Kent Road. Number plates were then unknown, but development had been rapid; and though the days of chivalry on the road unfortunately seemed to have passed, things had certainly changed for the better. Dust was the outstanding feature of early motoring, and protective coats and veils were the order of the day. Modern conditions had been made possible by one thing, and one thing only—the extended use of tar. This extended use the country owed largely to broad-minded county surveyors. The use of tar for roads had lately been referred to as bringing hardship on an industry in Wales (the patent-fuel industry); but water-tight and dustless roads had become a necessity, and tar must be used if it was the best medium for the attainment of these conditions. If the demand for road tar outpaced the supply from the distilleries, the normal economic course must hold, and the gas industry must sell in the best market. He referred to the new "Specification for Road Tar" as most important—a useful result of the attention recently given the matter by the Association of Tar Distillers and the Ministry of Transport. It would have a beneficial effect on tar production. The toast he had the pleasure of proposing was rather impersonal; but with it he associated the names of Sir Henry Maybury (not present) and Mr. E. S. Shrapnell Smith, the President of the Commercial Motor Users' Association.

Mr. E. S. SHRAPNELL SMITH, C.B.E., in reply, said he might claim to have been a pioneer of motoring—one of those who might have longed for the earlier advent of tar. Tar at first was a different product from to-day. It was, of course, dehydration and the removal of certain volatile constituents that had made the difference. He referred to the new specification as evidencing the powers of conference. In his opinion, however, the ultimate stage of tar use had not been reached; there was at present considerable talk of bitumen, and he thought there was a possibility of bringing bitumen and tar together. Road construction in this country compared very favourably with that in other countries, even America; and this position was entirely due to tar, and should be maintained.

Mr. F. E. BRISTOW, Chairman of Tarvia, Limited, then rose to propose the toast, "County Officials." The latter part of rather a long speech was audible with difficulty, but at the outset, after maintaining that the forcing-up of prices by current abnormal conditions should not be allowed to be detrimental to the great utility obtainable from tar, he dealt with the pollution of fisheries by the washings from tarred roads. He had gone carefully into the matter, and had no doubt that tar treatment had been seriously prejudiced by the use of inferior material. County surveyors should employ none but the best material, as infinite harm might be caused by the crude product. Further, tarring should be carried out scientifically, and there should be proper filtration of the surface water. He had recently discussed the subject with a friend who opined that the day of tar for road preparation was over, and instanced its effect on fish. At first his friend had hinted darkly at bitumen; but on being pressed, he (an enthusiastic fisherman) had confessed that fish caught in a bitumen area had had the distinctive taste of petroleum. Fishermen might be apprehensive of the use of tar on roads; but they would not be pleased if the miles of road they traversed to reach their streams were in the condition of the days before tarring.

Mr. A. DRYLAND, M.Inst.C.E., Engineer and County Surveyor of Middlesex, replied to the toast. The price of tar was certainly high; but it was natural that producers should sell in the highest market. He was an advocate of tar, and of good tar, and hoped for less bad tar than in the past. As for bitumen, it had been tried in America—at first, after one initial dressing of tar; but it had been found best to alternate the coatings of bitumen and tar, to avoid the danger of the less viscous material allowing of disintegration of the road. His opinion was that there were uses for both, but that tar distillers need not fear the ousting of tar by bitumen.

Mr. G. C. PARNABY, President-Elect of the Association, in proposing the health of "The Visitors," introduced Mr. M'Ilravy, of the Barrett Manufacturing Company, who met with a cordial reception. In his reply he emphasized the fact that they were all united in seeking the solution of present-day troubles and a reversion to a sane basis. He felt there was room for more common sense and less expert advice.

The toast of "The Chairman" was proposed by Mr. BAIRSTOWE, of Messrs. Turner and Co., Middlesbrough. In the course of a racy speech which was received enthusiastically, he made a brief reference to the recent policy of the patent fuel manufacturers. One could not blame them for seeking to preserve their industry, but strong objection might be taken to their methods of procedure.

The PRESIDENT (Mr. S. A. Sadler), Mayor of Middlesbrough, replied, also in light vein, and called upon Mr. M'Ilravy and Mr. Lemke (also from the States) to do their part in persuading the American Government to bring down the tariff on tar products. He laid stress on the cordial relationship which nowadays exists between distillers and merchants.

The evening was an undoubted success.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER 1000 C.FT. SOLD IN THE YEAR 1922.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

	Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Gas sold . . . . . thousands	32,313,544	14,656,033*c*	3,590,342	2,845,855	3,009,976	2,602,899	4,619,083
Gas made per ton of coal carbonized. cubic feet	12,906	12,729	13,406	14,613	12,168	13,655	..
Gas unaccounted for . . . . . per cent.	7·41	4·65	7·52	7·09	8·02	7·75	6·12
Coke made for sale per ton of coal . cwt.	10·65	9·70	11·36	10·22	9·92	9·13	10·39
Tar made per ton of coal. . . . . gallons.	9·31	9·23	9·81	10·31	9·50	8·79	10·32
Liquor made per ton of coal . . gallons, 8 oz.	35·22	39·35	38·63	36·04	35·81	31·12	36·40
Percentage of coke used as fuel	16·61	21·08	15·86	18·23	21·73	24·12	16·86
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Capital expended per 1000 cubic feet sold . . .	9 2·61	8 0·27	8 5·79	8 3·34	9 2·16	9 4·86	7 10·25
Price of gas equal to per 1000 cubic feet . . .	5/1¾, 4/7, 4/2	5/3½, 4/8	5/1¾, 4/9, 3/11½	3/6·30 to 5/11·44	4/6 28 to 6/4·36	4/10·5, 4/7	5/2 56 4/11·8 4/2·6
Costs per 1000 Cubic Feet of Gas Sold.							
REVENUE ACCOUNTS.	d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.	27·39	31·18*d*	28·92	31·60	31 90	29·59	31·18
Less residuals—Coke and breeze.	11·01	12·64	11·90	12·24	11·39	10 13	9 29
Tar	2·03	3·18	2·89	3·33	3·11	2·60	2 23
Amm. liq. and sulph. amm.	·97	1·66	2·22	1·35	1·09	·79	·61
Total residuals . . .	14·01	17·48	17·01	16·92	15·59	13·52	12·13
Net for coals, oil, &c. .	13·38	13·70	11·91	14·68	16·31	16·07	19 05
MANUFACTURE—							
Salaries	·54	1·48	·96	1·07	1·19	·57	1·02
Wages—carbonizing	2·91	3·64	2·97	3·15	3·95	3·63	3·47
Purification	·45	·67	·52	·90	·57	·77	·70
Repairs—plant	12·55	9·56	9·87	12·94	12·58	15·68	14·96
Net manufacture . .	29·83	29·05	26·23	32·74	34·60	36·72	39·20
DISTRIBUTION—							
Wages and salaries	2·35	1·85	2·13	2·18	2·59	1·61	2·53
Repairs—Mains and services, &c.	3·41	3·02	2·57	6·25	5·00	5·11	2·84
„ Meters and prep. meters and fittings.	2·09	4·63	3·63	3·65	4·12	3·05	2·17
„ Stoves—ordinary and prepayment .	2·61	2·98	2·84	4·24	2·33	1·59	2·14
Total net manufacture and distribution .	40·29	41·53	37·40	49·06	48·64	48 08	48·88
Public lamps—lighting and repairing	·93	1·04	·69	1·02	1·39	·70	·69
Rents, rates, and taxes	4·31	2·50	2·59	2·04	2·03	1·62*j*	1·94
MANAGEMENT—							
Directors, Auditors, and salaries (Secretary, &c.)	·42	·56	·71	·68	·83	·61	·60
Collectors	1·05	1·51	1·68	1·15	1·09	1·16	·96
Stationery and general charges	·64	1·22	·80	·97	·69	·75	·80
Profit-sharing	·42	·57	1·02	·63	·79	·64	..
Bad debts.	·09	·06	·10	·08	·03	·02	·04
Law and parliamentary charges	·02	·01	·05	·02	·01	·02	·03
Superannuations, Pension Funds, &c.	·88	1·23	1·33	·82	1·32	·62	·65
National Insurance	·31	·40	·31	·37	·29	·34	·35
Sundries	·06	·07	·05	·02	..	..	·04
Total expenditure (*less* residuals) . . .	49·42*a*	50·70*e*	46·73	56·86*h*	57·11	54·56	54·98
GAS.	55·62	57·51	52·26	55·69	61·94	56·81	58·35
Rentals—Meters and prep. meters and fittings.	3·63	4·25	3·55	5·30	2·87	1·91	4·44
Stoves	1·63	1·65	2·36	4·94	2·45	7·08	1·34
Incand. mantle maintenance . . .	..	..	·15	·51	..	·01	..
Miscellaneous	·20	·08	·04	·11	·06	·09	·06
Total—Gas, rentals, &c.	61·08	63·49	58·36	66·55	67·32	65·90	64·19
Balance, being profit	11·66	12·79	11·63	9·69	10·21	11·34	9·21
Dividend and interest	9·90	8·29	9 59	7·54	7·56	7·77	8·56
Surplus or deficit	1·76	4·50	2·04	2·15	2·65	3·57	·65
Contributions to funds and sundry payments .	1·20*b*	·64*f*	..	1·17*i*	·63*f*	2·46*k*	·57*f*
SUNDRIES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton	33 2·43	31 0·97*g*	32 4·99	35 4·88	..	35 8·69	..
Coke realized per ton of coal	14 6·20	12 4·76	14 6·96	13 4·11	13 6·39	12 3·40	13 8·48
Coke „ „ of coke	27 3·22	25 6·80	25 8·07	26 1·30	27 3·46	26 10·78	26 4·53
Breeze „ per ton	10 1·43	4 3·12	4 1·97	7 1·99	5 3·25	8 6·51	11 5·98
Tar realized per gallon	0 3·72	0 4·12	0 4·32	0 4·50	0 4·77	0 4·91	0 3·79
Amm. liquor, &c., realized per butt (8 oz.) . .	4 2·58	4 6·46	7 8·97	4 11·34	4 0·15	3 9·82	2 9·41
Percentage of stoves at rental to consumers . .	76	..	80	101	112	74	93
Bad debts per cent. on total receipts	·12	·08	·13	·10	·04	·03	·06
Net profit per cent. on ordinary capital	6·59	9 66	7·26	7·56	9·05	11·41 *l*	6·83
Water gas, per cent. on total make	30·99	..	18·56	9·53	24·43	25·64	..

a—Exors. Ilford Amalgamation eliminated.

b—Exors. Ilford Amalgamation . . . ·37
Special Purposes Fund . . . . . ·37
Redemption Fund . . . . . ·30
Reserve Fund . . . . . ·16
1·20

c—Estimated on average of 555 B.Th.U.

d—Including 3·28d. brought forward.

e—Special Purposes Fund eliminated.

f—Special Purposes Fund.

g—Including 3s. 3·18d. brought forward.

h—Special Purposes Fund and Capital Duty eliminated.

i—Special Purposes Fund . . . . . ·66
Capital Duty . . . . . ·13
Reserve Fund . . . . . ·38
1·17

j—Less Income-Tax *Cr.* ·32d.

k—Pension Fund . . . . . ·92
Renewal Fund . . . . . ·92
Reserve Fund . . . . . ·62
2·46

l—Including Electricity Results.

COMPARATIVE WORKING RESULTS OF THE THREE METROPOLITAN AND FOUR OF THE SUBURBAN GAS COMPANIES.

STATEMENT SHOWING THE WORKING RESULTS AND THE REVENUE ACCOUNT COSTS PER THERM SOLD FOR THE YEAR 1922.

Compiled by Mr. F. J. BRADFIELD, the Secretary of the Commercial Gas Company.

		Gas Light and Coke.	South Metropolitan.	Commercial.	Wandsworth.	South Suburban.	Tottenham.	Brentford.
Declared calorific value	B.Th.U.	475 & 500	550 & 560	475	470	460	450 & 500	460
Gas sold on declared calorific value	therms	157,721,353	81,340,965	17,054,125	13,375,519	13,845,888	12,332,334	21,247,780
Increase	per cent.	8·40	3·55	Dec. ·01	Dec. 1·23	3·66	4·98	4·07
Gas made per ton coal on works tests	therms	69·18	70·65*c*	69·07	69·93	..	69·37	..
Gas unaccounted for	per cent.	7·41	4·65	7·52	7·09	8·02	7·75	6·12
Coke made for sale per ton of coal	cwt.	10·65	9·70	11·36	10·22	9·92	9·13	10·39
Tar made per ton of coal	gallons	9·31	9·23	9·81	10·31	9·50	8·79	10·32
Liquor made per ton of coal	gallons, 8 oz.	35·22	39·35	38·63	36·04	35·81	31·12	36·40
Percentage of coke used as fuel		16·61	21·08	15·86	18·23	21·73	24·12	16·86
Capital expended per therm sold		s. d. 1 10·66	s. d. 1 5·35	s. d. 1 9·43	s. d. 1 9·14	s. d. 1 11·95	s. d. 1 11·82	s. d. 1 8·49
Price of gas per therm		1/1, 11d., 10d.	11½d., 10d.	1/1, 1/0, 10d.	9d to 15/5d.	11⅛d. to 16⅜d.	1/1, 11d.	1/1⅛, 1/1, 11d.
Costs per Therm Sold.								
REVENUE ACCOUNTS.		d.	d.	d.	d.	d.	d.	d.
Coals, oil, &c.		5·61	5·62*d*	6·09	6·73	6·94	6·25	6·78
Less residuals—Coke and breeze		2·25	2·28	2·50	2·60	2·48	2·14	2·02
Tar		·42	·57	·61	·71	·67	·55	·49
Amm. liq. and sulph. amm.		·20	·30	·47	·29	·24	·17	·13
Total residuals		2·87	3·15	3·58	3·60	3·39	2·86	2·64
Net for coals, oil, &c.		2·74	2·47	2·51	3·13	3·55	3·39	4·14
MANUFACTURE—								
Salaries		·11	·27	·20	·23	·26	·12	·22
Wages—carbonizing		·60	·66	·63	·67	·86	·77	·76
Purification		·09	·12	·11	·19	·12	·16	·15
Repairs—plant		2·57	1·72	2·07	2·75	2·73	3·31	3·25
Net manufacture		6·11	5·24	5·52	6·97	7·52	7·75	8·52
DISTRIBUTION—								
Wages and salaries		·48	·33	·45	·46	·56	·34	·55
Repairs—Mains and services, &c.		·70	·54	·54	1·33	1·09	1·08	·62
" Meters and prep. meters and fittings		·43	·84	·76	·78	·89	·65	·47
" Stoves—ordinary and prepayment		·53	·54	·60	·90	·51	·33	·46
Total net manufacture and distribution		8·25	7·49	7·87	10·44	10·57	10·15	10·62
Public lamps—lighting and repairing		·19	·19	·15	·22	·30	·15	·15
Rents, rates, and taxes		·88	·45	·55	·43	·44	·34*j*	·42
MANAGEMENT—								
Directors, Auditors, and salaries (Secretary, &c.)		·09	·10	·15	·14	·18	·13	·13
Collectors		·24	·27	·35	·25	·24	·25	·21
Stationery and general charges		·13	·22	·17	·21	·15	·16	·17
Profit-sharing		·09	·10	·21	·13	·17	·13	..
Bad debts		·02	·01	·02	·02	·01	·01	·01
Law and parliamentary charges		·00	·00	·01	·00	·00	·00	·01
Superannuations, Pension Funds, &c.		·18	·22	·28	·17	·29	·13	·14
National Insurance		·06	·07	·07	·08	·06	·07	·08
Sundries		·01	·01	·01	·01	..	..	·01
Total expenditure (*less* residuals)		10·12*a*	9·13*e*	9·84	12·10*h*	12·41	11·52	11·95
GAS		11·40	10·36	11·00	11·85	13·47	11·99	12·68
Rentals—Meters and prep. meters and fittings		·74	·77	·75	1·13	·62	·40	·97
Stoves		·33	·30	·50	1·05	·53	1·50	·29
Incand. mantle maintenance		..	..	·03	·11	..	·00	..
Miscellaneous		·04	·01	·01	·02	·01	·02	·01
Total—Gas, rentals, &c.		12·51	11·44	12·29	14·16	14·63	13·91	13·95
Balance, being profit		2·39	2·31	2·45	2·06	2·22	2·39	2·00
Dividend and interest		2·03	1·50	2 02	1·60	1·64	1·64	1·86
Surplus or Deficit		·36	·81	·43	·46	·58	·75	·14
Contributions to funds and sundry payments		·24*b*	·12*f*	..	·25*i*	·14*f*	·51*h*	·13*f*
SUNDRIES.		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coals cost per ton		33 2·43	31 0·97*g*	32 4·99	35 4·88	..	35 8·69	..
Coke realized per ton of coal		14 6·20	12 4·76	14 6·96	13 4·11	13 6·39	12 3·40	13 8·48
Coke " " of coke		27 3·22	25 6·80	25 8·07	26 1·30	27 3·46	26 10·78	26 4·53
Breeze " per ton		10 1·43	4 3·12	4 1·97	7 1·99	5 3·25	8 6·51	11 5 98
Tar realized per gallon		0 3·72	0 4·12	0 4·32	0 4·50	0 4·77	0 4·91	0 3·79
Amm. liquor, &c., realized per butt, 8 oz.		4 2·58	4 6·46	7 8·97	4 11·34	4 0·15	3 9·82	2 9·41
Percentage of stoves at rental to consumers		76	..	80	101	112	74	93
Bad debts per cent. on total receipts		·12	·08	·13	·10	·04	·03	·06
Net profit per cent. on ordinary capital		6·59	9·66	7·26	7·56	9·05	11·41*l*	6·83
One fifth penny variation equals		£131,434	£67.784	£14,212	£11,146	£11,538	£10,277	£17,706
Water gas per cent. on total make		30·99	..	18·56	9·53	24·43	25·64	..

a—Exs. Ilford Amalgamation eliminated.

b—Exs. Ilford Amalgamation ·07d.; Special Purposes Fund ·08; Redemption Fund ·06; Reserve Fund ·03 = ·24.

c—On Declared Value.

d—Including ·59d. brought forward.

e—Special Purposes Fund eliminated.

f—Special Purposes Fund.

g—Including 3s. 3·18d. brought forward.

h—Special Purposes Fund and Capital Duty eliminated. ·25d.

i—Special Purposes Fund ·14; Capital Duty ·03; Reserve Fund ·08 = ·25.

j—*Less* Income-Tax *Cr.* ·07d.

h—Pension Fund ·19; Renewal Fund ·19; Reserve Fund ·13 = ·51.

l—Including Electricity Results.

RESEARCH SUB-COMMITTEE OF THE GAS INVESTIGATION COMMITTEE OF THE INSTITUTION OF GAS ENGINEERS

The "Fairweather" Recording Calorimeter.

EIGHTH REPORT.

(*Continued from p.* 465.)

Causes of Variable Delivery and its Influence upon C.V. Determinations.—Although the changes mentioned in the preceding sections have been brought about by changing inlet meter pressure, the real factor to which attention must be paid is the pressure drop across the drum of the meter, for this influences the depression of water line in the measuring compartments of the drum, and the power which is available for keeping the pendulum in motion, or causing it to take up a rate somewhat in excess of that of a free pendulum of the same dimensions.

Variation in pressure drop across the meter may be due to several causes, one very important cause being variation in the specific gravity of the gas supplied to the meter.

Thus, assuming that the pressure at inlet meter remains strictly constant, but the specific gravity of the gas changes —whether by change in composition or a change in temperature and barometric pressure is immaterial—the pressure required to discharge gas at the required constant rate of 5 c.ft. per hour through the burner will be altered approximately in proportion to the specific gravity of the gas. The following is the pressure distribution taken from the recorder in a typical instance when using coal gas, specific gravity 0·52.

Pressure Inlet Meter. Ins. W.G.	Pressure Across Meter. Ins. W.G.	Pressure at Burner. Ins. W.G.
0·96	0·22	0·74

If, now, carburetted water gas of specific gravity 0·60 is supplied, the pressure required at the burner will be 0·85 ins. w.g. for discharge at 5 c.ft. per hour. The balance available for driving the pendulum and meter is now only 0·11 ins. w.g., sufficient to keep the drum moving as a free drum, but insufficient to keep the pendulum swinging properly, so that the escape wheel is not released and the meter comes to rest.

Clearly we may have any intermediate stage in which the meter merely runs somewhat slower than usual, or the opposite condition with an extra light gas is supplied, causing a speeding-up of the meter by allowing an increase in the driving force due to increased pressure drop across the drum.

There seems to be no doubt that these variations in specific gravity of the gas are responsible for the variations in gas rate shown in Table 1,* and alluded to at the opening of the section dealing with gas control.

The influence of these factors upon C.V. determinations cannot be overlooked. The fact that the meter is running a little above or below the standard rate will not of itself have the slightest influence upon a control test of C.V. made by its aid, for temperatures are observed and water collected over a specified number of revolutions of the drum—usually 4.

In making such a test, however, it has been implicitly assumed that the capacity of the drum per revolution has remained constant. Taking the figures of Table 4,† and assuming a linear law for the relation between capacity and variation in pressure drop across the meter for the limited range considered, it will be seen that 0·10 ins. w.g. increase in the pressure drop across the meter caused a change in capacity per revolution of 0·89 p.ct.

If, therefore, tests made with the meter are to be reliable within 0·1 p.ct. the pressure drop across the meter must not change by more than 0·01 ins. w.g. *from that which existed during calibration of the meter.*

Naturally a measurement of the pressure drop across the meter would allow a correction to be calculated. Constancy of pressure drop across the drum of the meter is therefore only second in importance to accurate water lining of the meter at the outset; and, roughly speaking, variation of 1/50 in. in the pressure drop across the meter is equivalent to 1/100 in. error in water lining and to 0·15 p.ct. on the capacity of the meter per revolution. This relation, found by direct experiment, is in reasonable agreement with that deducible from a knowledge of the relative areas of water surface in the meter exposed to inlet and outlet meter pressure respectively.

From the above it will be seen that since the rate at which gas is delivered to the calorimeter is the product of the rate of revolution of the meter and its capacity per revolution, a control test made in the ordinary way, taking into account only the variation in speed, will not show the true C.V. of the gas nor the full extent of the chart error.

Existing Difficulties and Suggested Improvements.—By far the most important cause of variation in pressure drop across the meter in the present instrument is the relatively high pressure required at the burner, which we have found to be about 0·75 ins. w.g. for a gas of specific gravity 0·52. Variations in pressure drop across the meter of ± 0·10 ins. w.g. would therefore be caused by gases of specific gravity 0·45 and 0·59 respectively, a variation which is perhaps unusual upon a town supply working to a specified C.V., but by no means abnormal on a "make stream." We have shown that this would account for a variation of ± 0·89 p.ct. in the capacity of the meter per revolution, and approximately ± 2·1 p.ct. in the timing of the meter, or a total of ± 3 p.ct. on the charted C.V. Of course, the more nearly constant in quality is the gas stream, as would be the case on a town supply working to a declared C.V., the smaller will be the fluctuations in rate and capacity, which may to some extent explain why this error has not been definitely located upon other instruments of the same make in use elsewhere. It is clear, however, that the gas rate can be only approximately constant, and will change with the specific gravity of the gas in use and to some extent with changes in temperature and barometric pressure. Changes under each of these heads have been detected upon the instrument examined by us.

It is suggested that a burner might be designed to deliver gas at 5 c.ft. per hour at a pressure of 0·15, or preferably 0·10 ins. water gauge. This might be done by using 4 or 5 burners in the burner head in place of the existing pair, opening out the existing burners, drilling the steatite head to form a rose-burner, or using an Argand burner. The only conditions to be fulfilled are that there should be complete combustion of the gas and that the size and shape of flames should be such as to be suitable for the comparatively small combustion chamber of the Boys' Calorimeter. Thus, with a burner working at 0·10 ins. w.g. with gas of specific gravity 0·50, the anticipated variations in burner pressure for gases of specific gravity 0·59 and 0·45 would be about ± 0·015 ins. w.g. This should allow control of the gas rate within ± 0·1 p.ct. in so far as it is affected by changes in the specific gravity of the gas supplied to the instrument.

We have made experiments with a burner designed to work at these low pressures, and it is clear that most exact governing of inlet meter pressure will be necessary. This may entail re-designing the existing governors, for they will not lift, even unloaded, with the pressures which it is suggested are advisable for the proper working of the meter. Little difficulty is anticipated, however, in obtaining a governor to fulfil the necessary conditions.

In suggesting the use of a burner, working at a lower pressure, we are only reverting to the original manner of using the escapement meter, and although not mentioned in the 5th Report, the pressure distribution of the escapement meter fitted to the Beasley Recorder for use with town gas would appear to be somewhat as follows :—

Inlet governors .	1·50-3·00 ins., preferably 2 00 ins. w.g.
,, meter . .	0·50-0·70 in. w.g. according to setting of governors.
Inlet burner . .	0·15-0·20 in. w.g.

The pressure drop across the drum is rather larger than in the "Fairweather" instrument, but the drum is much

* See last week's "JOURNAL," p. 463.
† *Ibid.*, p. 465.

smaller, and therefore the driving power available for a given pressure difference is smaller, and the 0·20-ins. pressure difference found by us to be satisfactory on the "Fairweather" instrument would be inadequate on the smaller meter.

Upon no occasion have we been able to operate the "Fairweather" Recorder with the 0·50 ins. pressure specified by the makers, sometimes given as inlet meter pressure and at other times as burner pressure. The burner itself requires about 0·75 ins. w.g. to pass coal gas of sp. gr. 0·52 at 5 c.ft. per hour, to which must be added 0·10 ins. to drive the drum of the meter, and a further 0·10 ins. to operate the pendulum, making in all practically 1 in. w.g. as the necessary inlet meter pressure in the instrument we have examined.

For our instrument we have found a pressure drop across the drum of 0·20 to 0·25 ins. w.g. to give the best all-round operating conditions. There is some little latitude in the choice of this pressure, but when once decided upon it is essential that the same pressure difference should always be employed both in the regular use of the recorder and during calibration of the meter.

The rate of the pendulum—conveniently observed over a period of 10 revolutions—is a most sensitive indicator of the effective driving force exerted by the drum. For most purposes it may be assumed that spindle friction and friction of the wheel train will remain constant over considerable periods, in which case constancy of the pendulum speed may be taken as an indication of constancy of pressure-drop across the meter, and the loading of the governors may even be adjusted to restore the correct rate after any departure has been observed.

A change in pressure difference across the drum of 0·10 ins. w.g. with our instrument corresponds with a change of 2 p.ct. in the pendulum rate, or a difference in timing over 10 revolutions of about 10 seconds.

Some caution is necessary in the application of these data, especially after the spindle gland has been newly packed, for we find that the spindle resistance does not settle down to a steady value until it has been running for some 12 hours after repacking. To a lesser extent there may be changes after removing and replacing the pendulum and escapement, while if the length of the pendulum is altered an entirely new calibration of the meter is called for, even if the pressure has been adjusted to give exactly the 5 c.ft. rate to the meter.

In any case, periodic observations of the pressure drop across the drum of the meter are advisable, and a sensitive pressure gauge must be used, *i.e.*, one by means of which 0·01 ins. w.g. can be determined with certainty.

(To be continued.)

BOARD OF TRADE GAS UNDERTAKINGS RETURN.

Finance and Prices in 1921.

READERS have already been acquainted with the great change that has been made in the form of publication of the Board of Trade return relating to all authorized gas undertakings in Great Britain, and with the equally great improvement which this change represents in comparison with the arrangement with which the industry has for so long been familiar. As has hitherto been the case, the return is still divided into two parts, though in an entirely different manner. Reference to the "JOURNAL" for Jan. 31 (p. 259) will show that, instead of the division being between the undertakings of companies and those belonging to local authorities, Part I. under the new scheme contains particulars relating to the manufacture and supply of gas by both classes of undertakings, while Part II. relates, on the same basis, to the financial side of the business. Part I., for the year 1921 (which was noticed in the number of the "JOURNAL" just alluded to), has been quickly followed by Part II., which is obtainable from H.M. Stationery Office, Imperial House, Kingsway, London, W.C., and branches, at the price of 10s. 6d. net.

As stated above, Part II. of the return relates to the finance of both classes of undertakings, and shows the prices charged for gas. Except where otherwise stated, the portion dealing with companies' undertakings refers to the calendar year 1921; but the information with regard to concerns in the hands of local authorities is for the financial year to March 31, 1922. The part which is now before us is sub-divided into two portions—companies and local authorities—as the finances of the two classes of undertakings are on different lines. The total number of undertakings dealt with in the return is 797, which compares with 798 for the previous year. The seven newcomers on the present occasion (others have ceased to appear in consequence of absorption) are all corporation concerns. Appreciative reference was made, when noticing Part I., to the clear type in which both figures and names now appear, and to the fact that the undertakings are placed in alphabetical order, instead of, as hitherto, under the names of the counties in which they are situated.

Exactly how the statistics are arranged will be seen from the headings to the two sets of tables which are reproduced overleaf. In the case of the companies, we see in col. 6 the receipts, expenditure, and balance carried to profit and loss account. For the local authorities, the same column furnishes the revenue, expenditure, and gross profit, while an additional one sets forth the amount of net profit or deficit and appropriation of net profit. The actual prices charged are shown for prepayment consumers, ordinary consumers, power purposes, &c., and public lamps—for the companies, in some instances per therm, and in others per 1000 c.ft. The scale of annual charges for meter rents to private consumers provides the final column for the tables, and illustrates the wide differences in practice existing in these matters.

Abnormal conditions have (as the total figures reveal) given rise to many deficits in the case of local authorities' undertakings, but in most instances they are not large. For Accrington a deficit is shown of £29,265, for Birkenhead £35,745, for Bolton £28,766, for Dewsbury £31,701, for Leeds £78,834, for Oldham £38,790, for Salford £24,989, for Wallasey £32,007, for Aberdeen £53,435, for Dundee £24,369, and for Glasgow £449,424. The appropriation of net profits has been for various purposes—frequently in reduction of previous losses. Sums contributed in relief of rates are on this occasion neither numerous nor large. Various amounts have been carried to reserve, while others have been applied to the reduction of the price of gas and to extension of works. Among the net profits, a sum is shown in the case of Nottingham amounting to £53,176.

The comparative tables which we reproduce set out the financial results separately for the companies' undertakings and those belonging to local authorities for the whole of Great Britain; in the former case for the years 1920 and 1921, and in the latter for the financial years 1920-21 and 1921-22. For the companies the figures in the body of the return now under review—that is, for 1921—are further split-up as follows: England and Wales: Total capital authorized, £99,097,311; capital and premiums paid up, £82,775,099; loan capital authorized, £32,272,941; loan capital paid up, £21,039,491; revenue account receipts, £51,678,639; expenditure, £47,416,090; profit, £4,363,421; loss, £100,872. Scotland: Total capital authorized, £325,656; capital paid up, £288,157; loan capital authorized, £84,083; loan capital paid up, £64,792; revenue account receipts, £191,419; expenditure, £172,086; profit, £19,333. Local authorities, 1921-22: England and Wales: Total amount of loans authorized, £46,162,170; money borrowed, £41,508,252; loans repaid and balance in sinking fund, £21,479,605; revenue receipts, £20,977,364; expenditure, £19,534,882; gross profit, £1,442,482; interest paid on loans, loans repaid, and amounts paid to sinking fund during the year, £1,956,001; deficit, £513,519. Scotland: Total amount of loans authorized, £14,605,717; money borrowed, £12,261,905; loans repaid and balance in sinking fund, £5,245,825; revenue account receipts, £5,591,780; expenditure, £5,526,849; gross profit, £64,931; interest paid on loans, amount of loans repaid, and amount placed to sinking fund during the year, £654,227; deficit, £589,296. In Scotland, in some cases the financial period is for the twelve months to May 15, 1922.

COMPARATIVE TABLES.

(*a*) COMPANIES' UNDERTAKINGS.

Year.	Number of Authorized Undertakings Included in Return.	Total Capital (Share and Stock.)		Total Loan Capital, Including Debenture Stock.		Revenue Account.		
		Authorized.	Paid-up.	Authorized.	Issued.	Receipts.	Expenditure	Profit.
		£	£	£	£	£	£	£
1920 . . .	494	98,469,716	82,065,243	29,109,279	18,418,665	53,714,841	49,566,608	4,148,233
1921 . . .	488	99,422,967	83,063,256	32,357,024	21,104,283	51,870,058	47,588,176	4,281,882

(*b*) LOCAL AUTHORITIES' UNDERTAKINGS.

Year.	Number of Authorized Undertakings Included in Return.	Total Amount of Loans Authorized.	Total Amount of Money Borrowed.	Amount of Loans Repaid, and Balance in Sinking Fund.	Revenue Account.			Interest Paid on Loans, Amount of Loans Repaid, and Amount Placed to Sinking Fund.	Net Profit or Deficit.
					Receipts.	Expenditure.	Gross Profit.		
		£	£	£	£	£	£	£	£
1920–21 . .	304	52,823,504	48,916,008	25,076,806	27,244,570	24,535,685	2,708,885	2,269,573	439,312 profit
1921–22 . .	309	60,767,887	53,770,157	26,725,430	26,569,144	25,061,731	1,507,413	2,610,228	1,102,815 deficit

RETURN RELATING TO ALL AUTHORIZED GAS UNDERTAKINGS IN GREAT BRITAIN FOR THE YEAR 1921.

(*a*) COMPANIES' UNDERTAKINGS.

Name of Company.	1. Special Acts of Parliament and Orders Relating to the Undertaking.	2. Total Capital (Share and Stock) Authorized on Dec. 31, 1921, and Maximum (M) or Standard (S) Rates of Dividend Authorized Thereon.	3. Total Capital (Share and Stock) and Premiums Paid up on Dec. 31, 1921, and Actual Rates of Dividend Paid Thereon for 1921.	4. Total Loan Capital, Including Debenture Stock, on Dec. 31, 1921.		5. Rates of Interest Paid on Loans and Debenture Stock for 1921.	6. Revenue Account for 1921.	7. Maximum (M) or Standard (S) Price for Gas (*e*) per Therm (*f*) per 1000 C.Ft.	8. Actual Prices Charged for Gas on Dec. 31, 1921, Showing Discount (if any) (*e*) per Therm. (*f*) per 1000 C.Ft.	9. Scale of Annual Charges for Meter Rent to Private Consumers.
				Authorized.	Issued.		Receipts, Expenditure and Balance Carried to Profit and Loss Account.		(*a*) To Prepayment Consumers (including hire of meter, &c.). (*b*) To Ordinary Consumers. (*c*) Special Prices for Power, &c. (*d*) For Public Lamps.	
		£ Per Cent.	£ Per Cent.	£	£	Per Cent.	£	s. d.	s. d.	

(*b*) LOCAL AUTHORITIES' UNDERTAKINGS.

Name of Local Authority.	1. Special Acts of Parliament and Orders Relating to the Gas Undertaking.	2. Total Amount of Loans Authorized up to March 31, 1922.	3. Rates of Interest Payable on Loans.	4. Total Amount of Money Borrowed up to March 31, 1922.	5. Amount of Loans Repaid and Balance in Sinking Fund on March 31, 1922.	6. Revenue Account for Year Ended March 31, 1922: Revenue, Expenditure, and Gross Profit.	7. Interest Paid on Loans; Amount of Loans Repaid; and Amount Placed to Sinking Fund During Year Ended March 31, 1922.	8. Amount of Net Profit or *Deficit* and Appropriation of Net Profit (Deficits are Shown in Italics).	9. Maximum Price for Gas per 1000 C.Ft.	10. Actual Prices Charged for Gas per 1000 C.Ft. on Dec. 31, 1921, Showing Discount (if any). (*a*) To Prepayment Consumers (including hire of meter, &c.). (*b*) To Ordinary Consumers. (*c*) Special Prices for Power, &c. (*d*) For Public Lamps.	11. Scale of Annual Charges for Meter Rent to Private Consumers.
		£	Per Cent.	£	£	£	£	£	s. d.	s. d.	

FRENCH GAS LEGISLATION.

(*Continued from p.* 390.)

The French gas industry during the war had temporary experience of working under the conditions now proposed; and though the law of November, 1915, was only an emergency measure, its régime proved that there is nothing startling in low calorific powers and benzole stripping. The only complaints from consumers concerned the lack of pressure too often found in Paris and elsewhere.

The Heavy Hydrocarbons in Use.

The Report proceeds to examine the essential difference between the old flat flame and the modern bunsen flame; pointing out that the luminous property of the unaerated flame is due to the particles of carbon within the cone of burning gas being raised to incandescence, but not being combusted till they reach contact with the air at the flame surface. These carbon particles are derived from dissociation of the heavy hydrocarbons in the gas, such as benzole; and a gas containing sufficient heavy hydrocarbons to give the old standard of illuminating power has, by virtue of their presence, a calorific power round about 5000 calories per cub.m. The advent of the incandescent burner has, in the opinion of M. Régnier, swept away the necessity for such high calorific powers; and their inclusion in modern gas orders can only be the result of ignorant striving to curry favour with the public who, beyond a few flat-flame burner users, have no interest in the matter.

On the contrary, these heavy hydrocarbons, which raise calorific power to such a level, are not easily combusted in the ordinary appliances in use; for either by reason of insufficient pressure to supply the required volume of air in the bunsen tube, or through improper working of the regulator, they undergo partial cracking (as in the flat flame), and particles of carbon separate-out and are improperly burned. This gives rise to sweating and the formation of carbon monoxide; whereas a stripped gas presents neither of these disadvantages but almost as many available heat units. On the face of it, however, the removal of benzole from town gas represents a lowering of the calorific power by 8·6 calories per gramme extracted; and the enforcement of scrubbing must carry with it abolition of high minimum heating values.

The Argument for Lower Calorific Powers.

Reference has already been made to the part the proposed measure can play in helping France out of her motor-spirit difficulty; and it has been noted that even a small works favourably situated and without the shackles of a high calorific standard, could produce some 25 tonnes of benzole a year. More than a hundred small works in Germany are said to be extracting benzole by the aid of some new material (which is not specified in the original). Less apparent are the advantages to be gained in the direction of fuel economy and the lowering of heat production costs. This aspect must be considered in connection with the working conditions of the gas industry bearing in mind that, in working to some definite calorific power, it is the last made calories that cost the most; whence it comes about that the mean net cost of the calorie is higher the higher the calorific power—and the selling price of the calorie is all that matters to the consumer. Beyond a point the calorific power of gas is analogous to the speed of a ship or the temperature of an oven—to increase the speed by a knot or the temperature by a few degrees, often means nearly doubling the fuel consumption.

The advantages to be gained by the reduction of calorific power may be enumerated as follows: (*a*) more efficient utilization of

coal; (*b*) the possibility of employing lower-grade coals; (*c*) the ability to distribute in certain cases coke-oven gas; (*d*) the permissibility of admixing a proportion of water gas. These are all important advantages which are brought within reach by the lowering of calorific standards; but it is necessary to lay special stress on the latter two. In practice, coke-oven gas is regarded by those who make it simply as a bye-product of their chief commodity—metallurgical coke; and providing this coke has the desired qualities, not much attention is given to the other products. The mean calorific power of coke-oven gas normally does not exceed 4000 calories, and in order to render available gas of a higher heating value, two collecting mains must be employed, the lower-grade gas made at the end of the carbonizing period being used for heating the benches—often under highly inefficient conditions. Thus, the employment of coke-oven gas for town purposes necessitated an upper limit of 4000 calories.

The advantage is obvious of being able to supply a small township with the make of a coke-oven installation, distant or near at hand, without having to construct a small local gas-works; and in this connection it is interesting to note that in the United States natural gas is often boosted hundreds of kilometres to the point of consumption. High-pressure distribution can be carried out without increasing to excess the diameter of the mains; and such an installation is at present under consideration for the town of Lyon to be supplied by natural gas pumped from Vaux-en-Bugey, 40 kilometres away. With regard to water gas, the growth of the coking industry is making it more and more desirable for the gas industry to use its surplus coke by mixing water gas with coal gas; but the calorific power of water gas is only 2500 calories. Thus if one seeks to progress along these lines of advantage alike to consumer and undertaker, one must rest content with gas of lower thermal content. True, the employment of water gas is only authorized providing an addition is made of heavy hydrocarbons, which supply the characteristic odour of coal gas, and incidentally raise the calorific power slightly. At the same time, the calories from these enriching agents are relatively expensive, and their use should be curtailed as far as possible.

THE COMMITTEE'S CONCLUSIONS.

From the foregoing considerations, M. Régnier's Committee came to the following conclusions:

(1) The extraction of benzole from town gas diminishes its calorific power theoretically by some 8·6 calories per gramme of benzole, or about 170 to 260 calories per cub.m. according to the degree of scrubbing. In spite of this diminution of heat content, the efficiency of utilization of the debenzolized gas is practically unimpaired and the highest temperatures required in industry are attainable with it.

(2) In reducing the calorific powers hitherto specified in gas orders, and no longer making stipulations of illuminating standards, may be found the following advantages:

(*a*) The complete gasification of certain suitable coals may be envisaged. By this means the heat units which otherwise remain in the coke and tar may be rendered available in the gaseous state, without the intervention of low-efficiency processes or expensive enrichment; and this again tends to the reduction of the net cost of the gas.

(*b*) Considerable economies will be realizable in the coal account.

(*c*) Many stations will be enabled to reduce their charges for gas through co-operation with coke-ovens.

(*d*) One will be able, within the limits specified by the Ministry of Health, to develop to advantage the utilization of water gas.

Since the recovery of benzole necessitates the revision of gas orders and the reduction of calorific powers by 200 or 300 calories below the 5000 standard, one may just as well go all the way and specify such a value as will enable the price of the calorie to be brought as low as possible. It remains to determine what the limit of the calorific power shall be; and obviously it must depend upon the situation of the gas undertaking. Such factors as a ready supply of low-grade coal or the proximity of coke-ovens must be taken into consideration, as also the extent of the district and the distance therefrom of the gas-making station, it being borne in mind that the size of the distributing system must increase according as the calorific value decreases and the demand develops.

The Sub-Committee on Carbonization discussed the matter very thoroughly and concluded that an upper limit of 4000 calories was ample from every point of view; and our recommendation is that the original limit of 4700 calories (as proposed in the first draft of the Bill) should be lowered to that figure. Furthermore, it should apply not only to new orders, but to old ones as they come up for modification. It is undoubtedly in the general interest, and should be adopted as widely and as quickly as possible.

The original draft included a clause stipulating that the price should be a function of the thermal value of the gas supply; but M. Régnier's Report recommended the elimination of this, as the price to the consumer must depend upon a diversity of local circumstances. But it is within the power of the Minister of the Interior, advised by an expert committee, to examine prices and make recommendations to the authorities concerned.

As for water gas, the Report considers the time has passed when any limit should be imposed. The supposed danger of this gas is intimately bound-up with its content of carbon monoxide; and the total quantity of this constituent of town gas is limited to 15 p.ct.—a figure determined by excessive prudence and more than sufficient as a safeguard.

The text of the clauses of the Benzole Bill under review appear on p. 644 of the "JOURNAL" for Sept. 20 last.

THE DURABILITY OF REFRACTORIES.

By G. M. GILL.

A paper read before the Royal Society of Arts by W. J. Rees, B.Sc.Tech., F.I.C. (Lecturer on Refractories, University of Sheffield), on February 14 deals with this important question in a way which cannot but be helpful and instructive to the gas engineer, who, it is suggested by the writer, stands to gain greatly from the intelligent use of such information as is put forward by Mr. Rees, who is an undoubted authority on this question. The writer had the privilege of hearing the paper, and was much impressed by its practical nature.

IMPORTANCE OF REFRACTORIES DURING THE WAR.

The lecturer rightly pointed out that, "during the European war the limiting factor in the production of munitions was the rate of production and application of refractory materials for the building and maintenance of furnaces for the metallurgical, glass, and ceramic industries." Gas engineers will remember that during the war it was impossible to purchase silica bricks, which were required for use in other industries more dependent upon that class of bricks than were the gas undertakings.

It was pleasing to hear from Mr. Rees that undoubted progress was being made in the production of better refractory materials, and he referred to a distinct improvement which he had observed during the past ten years. He further stated that in many of our universities and technical colleges the study of refractory materials is receiving increased attention. For example, in the University of Sheffield, refractories form a final subject in the examinations for degrees and diplomas in metallurgy, fuel technology, and glass technology.

To all thinking men it is obvious that the careful research which is now taking place in many universities and similar institutions is bound to be the forerunner of the employment of better methods in the manufacturers' works. Such improvement can, in fact, always be predicted as the result of preliminary scientific and research work in universities.

The lecturer stated that the natural resources of raw material for the manufacture of fireclay and silica bricks in this country are not only of great magnitude, but are also equal in every respect to those of any other country; and there is therefore no valid excuse should the finished material be lacking in quality.

THE REQUIREMENTS OF THE GAS INDUSTRY.

While Mr. Rees stated that a steady improvement was being maintained in the quality of refractories manufactured, he also remarked that there was a great need for the production of refractory materials of still higher grade. The writer can fully endorse this statement—In fact, he would go further, and say that if all the gas undertakings were forthwith to adopt only the most suitable refractory materials, some manufacturers' works would shut down, while others would require to be enormously increased to cope with the demand.

During the discussion the writer ventured his opinion that the need of the gas-works was for materials which, with combustion chamber temperatures up to 1370°C., do not appreciably expand or contract during their working life, and further that such grade of material is required for the larger part of retort-setting brickwork. All gas engineers will have had experience of the dropping or sagging of their retorts, due to the contraction of the walls supporting these; but with material as specified above, the retorts would remain true and level throughout their life. The lecturer referred to the fact that neither the manufacturer nor the user of refractories had until recently any precise knowledge of the conditions existing in the various parts of industrial furnaces, and that this leads at times to the use of materials the failure of which is inevitable.

PROPER BASIS FOR VALUING REFRACTORIES.

Mr. Rees further stated that the selection of refractories which will have a high durability factor, and so assist in maintaining a continuous output, is an important factor in the cost of production in industry The writer was glad to hear the lecturer state that—

> The life of a furnace or furnace lining should, therefore, not be measured in days, weeks or months (or even in heats); the factor to ascertain, and the only sound basis on which to make comparisons, is the cost of refractories per ton (or other unit) of saleable product. Adequate refractories will facilitate rapid production, and although the first cost of such material may be higher, and their life no longer, very definite economies in cost of production may be possible.

This is entirely the truth in the case of retort-settings, upon which large sums may be saved by the use of correct and suitable refractories.

IMPORTANCE OF PRELIMINARY TESTS.

The lecturer referred to the importance, before undertaking

an expensive experiment, of first carrying out proper tests of the materials which it is proposed to use. As he said, "Progress in the improvement of refractories, or in the development of new types of refractory, can but be slow and hesitating if the only available test of their efficiency is that of behaviour under service conditions." Often some costly experiment is started which is doomed to failure, and which would never have been commenced had the materials been first submitted to laboratory tests at the cost of a few pounds. This view is entirely in accordance with those of the writer, who thoroughly endorses the value of careful preliminary experiments on the laboratory scale, before committing oneself to the expenditure of large sums of money on working-scale experiments. Refractory materials do, in fact, readily lend themselves to the making of valuable experiments in a properly equipped laboratory, provided, of course, with experimental furnaces; and practically all the characteristics which are of importance in practical use can be assessed within reasonable limits at their proper value.

FAILURES—AND THEIR CAUSES.

The author of the paper made an analysis of failures which have come under his notice, and divided these into four classes as follows:

(a) Unsatisfactory quality, including lack of uniformity of quality.
(b) Faulty selection owing to the absence of knowledge of the conditions.
(c) Faulty treatment of the material in service, due either to accident, carelessness, or ignorance.
(d) Failure to allow a margin so that abnormal conditions of short duration may be withstood—in other words, the absence of a factor of safety.

All engineers have been concerned with "failures" in refractories, and there is no gainsaying the fact that to avoid these it is necessary to have knowledge of the proper materials to use in the various parts of a producer or retort-setting, as bricks which would be suitable for one situation are entirely unsuitable in another. While there is in gas-works no subject of greater importance than the use of suitable refractory materials, there is also no subject which is more complicated and difficult, if common-sense rules are ignored. Failures can be attributed to a policy of leaving to chance matters which admit of ready determination by careful but simple calculations based upon experiment.

REFRACTORINESS WITHOUT AND WITH LOAD.

It was further stated that the fusing-point of a firebrick may be taken at 1600° to 1720° C., and of a silica brick at 1650° to 1700° C. This is, of course, with no load placed upon it, but he further stated that the behaviour of such bricks under a load of 50 lb. per sq. in. would be:

Firebrick deforms at 1300° to 1450° C.
Silica brick is rigid to 1500° C., but deforms at 1550° to 1680° C.

These figures show the great reduction in refractoriness brought about by placing loads upon firebricks when heated to the working temperatures of retort-settings.

Figures relating to refractoriness without load can be, in the writer's view, most misleading if their full significance is not understood, as in the important parts of settings firebricks are always under load, though it is not possible to calculate with any certainty the amount of load; and therefore, before using large quantities of new firebricks, tests under load are of the greatest importance.

FACTORS AFFECTING DURABILITY.

The lecturer's conclusions on this point are well worthy of careful attention. He states that the durability of refractories is dependent upon the following factors:

1. The softening temperatures.
2. The mechanical strength at normal and high temperatures.
3. The thermal or reversible expansion.
4. The permanent expansion or contraction.
5. The resistance to abrasion.
6. The resistance to slag attack.
7. The permeability to gases and vapours at high temperatures.
8. The resistance to abrupt thermal changes at high and low temperatures.
9. The changes in properties after prolonged heating.

Such varying properties emphasize the importance of small-scale experiments and expert advice before arriving at important decisions in regard to the use of refractories.

TWO SIMPLE METHODS OF TESTING FIREBRICKS.

Mr. Rees described two simple methods of testing firebricks which may usefully be repeated here:

1. A simple method of applying the load test is to support a brick on its two ends, leaving a clear span of 7 or 8 in., and load it in the centre with a heavy brick (such as a chrome brick) on end. Then heat to 1400° C. (or upwards) and observe the deformation, if any, produced.
2. A useful test is to heat one-half of a brick for a few hours at the temperature at which it is to be used, and then to compare the two halves of the brick.

SILICA BRICKS.

In the latter part of his paper, the lecturer dealt fairly fully with silica bricks. As is well known the greatest drawback with silica bricks is the amount of expansion experienced when the brick is heated. Useful methods are now employed in arriving at the amount of after-expansion which is likely to be experienced, and it is very unwise, to say the least, for engineers to use silica bricks of which they have had no previous experience without first carrying out after-expansion tests. As Mr. Rees states, "It should be possible for a manufacturer of silica bricks to prepare from experimental data a chart on which the after-expansion could be read off from a determination of the true specific gravity."

It was comforting to hear from Mr. Rees that there is now no difficulty in obtaining in this country silica bricks which will fully meet the stringent specification necessary for coke-oven use, and that some which he has tested recently are equal to the best American or Continental bricks. There is no doubt that those who, like Mr. Rees, are daily testing refractories, are in the best position for noting the progress being made in the production of materials.

In enlarging upon the superiority of silica bricks to fireclay bricks for certain purposes, the lecturer stated that: "Even the highest grade of fireclay brick will deform under load at a temperature well below its normal softening point, while a highly-converted silica brick of low porosity will carry load almost up to its fusion point." In connection with this statement, the writer would point out that by using a semi-silica or siliceous brick, which is in so many respects the happy medium between the fireclay and the silica brick, the danger of deforming under load at any but very high temperatures is largely removed, and without having to provide for the expansion of high-silica (95 p.ct.) bricks, which can be so serious if full information is not forthcoming of the proper methods to employ to counteract it.

The lecturer concluded his paper by emphasizing the importance of collaboration of the maker and the user of refractories; and there is not the slightest doubt that with the proper amount of co-operation, combining the knowledge of the two parties, very great progress will be made both in the manufacture and the use of refractories. It is impossible to praise the paper too highly. It was full of matter of the greatest possible utility to both makers and users, and the writer trusts that it will be in due course published in a form in which it can conveniently be used by all sections of those concerned with refractory materials.

MIDLAND JUNIOR GAS ASSOCIATION.

Mr. C. F. W. RENDLE (Redditch) presided at a meeting of the Midland Junior Gas Association at the Council House, Birmingham, on Thursday, the 15th inst., when, before a fairly large attendance of members, Mr. J. POULSON (Stafford) read a paper entitled

EXPERIENCES OF VERTICAL RETORTS.

Before dealing with the subject proper of the paper, the author gave a description of the vertical-retort plant at Stafford, and its operation. The installation was erected by Messrs. West's Gas Improvement Company, of Manchester, and was started-up in March, 1919. There is one bench of four settings, each containing eight retorts, working in units of four, and each setting has its own external producer. The coal and coke handling plants are driven by electric motors. The operation of the retort installation is as follows: The coal supply for carbonization is taken from the overhead bunkers to the feeding hoppers, from which the coal falls by gravitation into the retort. The resultant coke is extracted at the base of the retort by means of a worm, which also supports the charge, and which slowly revolves on a vertical axis. The coke falls into a receiving chamber, from which it is periodically discharged through gas-tight doors. The speed of extraction of the coke regulates the speed at which the coal passes through the retort. The fuel-gas for heating the retorts is generated in producers of the open step-grate type, without clinkering doors. Each producer supplies two groups of four retorts each, each group being controlled by a main producer-gas damper near the base of the ascending flue. The products of combustion, after heating the retorts in their passage to the back of the setting, enter a common vertical waste-gas flue, and circulate the chambers surrounding the top portion of the retorts, heating the incoming coal contained therein. The waste gases then pass master-dampers to the chimney, preferably through a waste-heat boiler.

The retorts are approximately elliptical in cross section, and are uniformly tapered from top to bottom to allow of easy passage of the charge through the retort. The total length of the retort is 21 ft. 1½ in. The top and bottom portions of the retorts are of fireclay, the top being moulded in one piece, and the bottom composed of hard-burnt fireclay blocks. The intermediate portion is made up of tongued and grooved silica sections. The lining of the combustion chambers, and the dividing floors are built with special silica bricks and tiles respectively. The gas off-take is taken from one side of the top retort mouthpiece, and is controlled by a valve which is bolted to the gas collecting main. A weir arrangement is fitted at the lower end of the collecting main, as is also a valve, through which the whole condensates in the main are drained periodically into the foul-gas main, and from there to a seal pot. The gas connection to the foul main is also

controlled by a valve. Steam is admitted at the top of each chamber at the base of the retort, and by this means the coke is cooled, so that further quenching is unnecessary. The steam, in its passage through the hot coke, is raised to the temperature of its decomposition into water gas.

Experience with Coals.

During the four years the plant has been in operation, many classes of coal have been carbonized, and the variation in the gas and bye-product yields, rate of carbonization, and other factors, in the qualities used, have been most marked. Gas-yield values have varied from different qualities of coal by over 20 p.ct. The qualities of the resultant coke have also varied greatly. The ash content of coals calls for particular attention, as the detrimental effects of a high ash content are far reaching, affecting as it does the temperatures and throughput of the plant, the quality of coke, carbonizing costs, and the efficiency of carbonization generally. The advantages derived from the carbonization of coals that are easily carbonized are worthy of consideration, as by using them a greater throughput is obtained, resulting in economy of fuel used, and lower manufacturing costs. Although a coal with a higher coking-power may give a slightly better gas yield per ton of coal carbonized, it has been found that the advantages of using a more easily carbonized coal outweigh this. The presence of dust in coal has proved detrimental, as it does not lend itself to speedy heat penetration, thus reducing throughput. The plastic layer formed in the carbonization of a highly-caking coal is thick and tenacious in itself, and the presence of dust in such a coal greatly adds to this difficulty, and entails heavy labour in maintaining the continuous travel of the coal that is so desirable. The sulphur content of the coke is largely affected by the sulphur content of the coal, as also are purification costs. The size of coal used has its effect on the speed of carbonization; and where this effect is of a minor degree in easily carbonized coals, it becomes a matter of importance in strongly-coking coals. The elimination of foreign matter in coals is best dealt with at the colliery; and a knowledge of the screening and washing-plant employed is useful in the effort to secure deliveries of the cleanest fuel possible.

The coal used is obtained from Derbyshire and North Staffordshire, and is composed mainly of washed nuts. A small proportion of washed beans is used. The average composition, in the proportion to the quantities used, is as follows:

Wet Basis.		Dry Basis.	
Moisture	7·42	Moisture	—
Volatile matter	31·33	Volatile matter	33·84
Fixed carbon	57·07	Fixed carbon	61·65
Ash	4·18	Ash	4·51
	100·00		100·00
Sulphur content	0·72 p.ct.	Sulphur content	0·78 p.ct.

Calorific value, dry basis, 13,700 B.Th.U.
Calorific value, wet basis, 13,130 B.Th.U.
Determinations made in Mahler Donkin's bomb calorimeter.

The moisture content of the fuel is rather high, this being due to the short period of transportation from the collieries to the works. However, this is not without its advantages, as the outgoing gases from the retort are protected from excessive temperatures at the top of the retort, and the moisture produced tends to keep the off-take pipes and fittings clear from deposit. Steaming is practised to the extent of about 21 p.ct., taken on the wet basis of the coal, and the steam pressure is uniformly maintained at 28 lbs. per square inch. It has been found that a better decomposition of the steam takes place when passing through the coke of an easily carbonized coal. This may be accounted for by (*a*) the coke is of an open texture, and friable nature, (*b*) the size of the coke is rather small, and regular, (*c*) the gases have a longer time contact with the coke, and at a higher temperature, due to carbonization of the coal being completed at an early stage of its passage through the retort.

Temperatures of Settings.

The temperatures used in the various chambers (taken from the non-producer side of the setting) are as follows:

No. 2.	Flue-gas circulating chamber	920 °C.
No. 1.	,, ,, ,,	1080 ,,
No. 6.	Combustion chamber	1280 ,,
No. 5.	,, ,,	1280 ,,
No. 4.	,, ,,	1260 ,,
No. 3.	,, ,,	1220 ,,
No. 2.	,, ,,	1190 ,,
No. 1.	,, ,,	1190 ,,
No. 2.	Secondary-air flue	740 ,,
No. 1.	,, ,, ,,	510 ,,

The temperatures of the combustion chambers are maintained as even as possible throughout their length, and the difference in temperature from the retort nearest the producer side to one on the waste-gas side is about 50° to 60° C.

Results.

The gas yield averages 18,500 c.ft. per ton, of an average calorific value of 437 B.Th.U. The inert content averages below 14 p.ct. The quality of gas as made is liable to a variation of about 15 B.Th.U. per c.ft. This is mainly due to the varying quantities of air admitted for purification *in situ*, the purifiers now in use being of insufficient capacity. It is anticipated that the purification in the larger sized purifiers, now nearing completion, will prove efficient with a uniform percentage of admitted air, thus assisting in the production of a gas of a more even calorific value.

The coke produced is of a friable nature, and has the desirable free-burning quality, rendering it suitable for domestic use. It is interesting to note that the coke produced has proved admirably suitable for use in drying and heating kilns, used for the manufacture of a specialized product. The successful operation of these kilns is dependent on extremely slow drying and heating of the materials contained therein, the least possible draught being given at these stages. The free-burning quality, low moisture, and fairly low ash content of the coke supplied, have enabled us to give satisfaction to this consumer, whose consumption of coke is over 20 p.ct. of our output.

The yield of coke is as follows:

Coke available per ton of coal carbonized	7¾ cwt.
Coke used in steaming	1¼ ,,
Coke used on producer-fires	2¼ ,,
Coke dust made (under ¾ in.)	¼ ,,

The average assay of the coke as drawn from the retorts is as follows:

	P.Ct.
Moisture	·53
Volatile matter	·88
Fixed carbon	90·50
Ash	8·09
	100·00

Sulphur content, 0·64 p.ct.
Calorific value of coke, 12,060 B.Th.U. per lb.

Tar produced per ton of coal carbonized	17·3 gallons
Specific gravity	1·095
Water content	3·5 p.ct.
Free carbon	3·1 p.ct.

23 lbs. of neutral dry quality, testing 25¼ p.ct. ammonia, are obtained per ton of coal carbonized. Ammonia is at present allowed to go forward to the purifiers to assist in purification.

Points for Consideration in Gas Production.

A uniform vacuum is necessary on each setting, and on each retort, otherwise inerts are liable to be drawn in wherever there is excessive pull, and degradation and loss of gas is liable to take place where there is pressure. The regulation of the main gas valve from each setting gives remedy to any variation in pull, such as may be caused by the position of the retort-house governor. In the case of the individual retorts of a setting the desired evenness of pull is attained by equalizing their output. This is ensured by even temperatures and throughput of each retort.

The importance of sound retorts cannot be too strongly emphasized, and no effort should be spared to maintain the retorts in first-class condition. Inerts are liable to be drawn through unsound fittings. The asbestos joints of the coke-discharge doors, and inspection doors—although effective in their use—need periodical renewal. Continuous travel of the charge is essential for good results, and correct temperatures and smooth retorts materially assist in obtaining the desired effect. For this reason, it has not been found advantageous to defer scurfing operations over a period of 5½ weeks.

Naphthalene in Gas.

Since the commencement of operation of the vertical retorts, the district has been remarkably free from naphthalene, and there has not been recorded one single complaint from this cause for over 3½ years. The naphthalene content of the gas is ·85 grain per 100 c.ft. It might here be mentioned that the freedom from such deposit has permitted the installation of a station-meter of the rotary type, but further information regarding this is not yet available, the meter having been in operation only a few months. There has been complete freedom from pitchy troubles.

Refractory Materials Used in the Settings.

The whole of the silica materials used in the settings was manufactured by the Derbyshire Silica Firebrick Company. Examination of the materials proved them to be remarkably true to size and shape. The surfaces were smooth, and edges well defined. The fracture of portions of the various segments revealed a uniformity of texture. Small nodules of unconverted quartz were evenly disseminated throughout the mass. The materials used in the construction of the floors of the combustion chambers were of close texture, and the strength of the materials was good, when taking into consideration their composition.

The following are analyses of the various portions used:

Silica Retort Segments.

	P.Ct.
Silica	89·27
Titanic oxide	0·77
Alumina	8·53
Ferric oxide	0·84
Manganese oxide	*Nil*
Magnesia	0·23
Lime	*Nil*
Potash	0·20
Soda	0·30
Loss	0·05

Combustion Chambers.

	P.Ct.
Silica	91·60
Titanic oxide	0·46
Alumina	6·32
Ferric oxide	0·30
Manganese oxide	*Nil*
Magnesia	0·21
Lime	0·26
Potash	0·85
Soda	0·18
Loss	0·09

Ordinary Silica Brickwork.

	P.Ct.
Silica	87·23
Titanic oxide	1·85
Alumina	8·55
Ferric oxide	1·25
Manganese oxide	*Nil*
Magnesia	0·10
Lime	0·28
Potash	0·54
Soda	0·36
Loss	0·25

MANAGEMENT OF SETTINGS, REPAIRS, &c.

Care in the drying and heating-up of the settings is essential; otherwise cracking and distortion of the retorts will take place. Cutting flames in the combustion chambers are to be avoided, not only because of the serious detriment to the refractory material by the local heating thus caused, but the deficiency in temperature further along the combustion chambers necessitates a decrease of throughput of the retorts affected. A uniform supply of producer gas to the combustion chambers is essential to maintenance of temperatures. To attain this, the cleaning of the fires is done in two operations, alternate sides of the step grate being done each two hours. The removal of the deposit of flue dust along the floors of the combustion chambers is necessitated every five weeks. Slagging of the floors of the higher-temperatured combustion chambers takes place, but as long as the surface formed remains intact, and free from cracks, further penetration of the fluxes into the refractory material is arrested. Thus the necessity for regular temperatures again asserts itself.

Although the life of a setting is dependent in the first instance on the quality of materials and workmanship, there is no doubt that timely repairs of a first-class order materially add to this. The result of an internal examination of a setting of retorts, and the repairs carried out, may be of interest. Previous repairs had not been necessary, with the exception of pointing of the joints, and washing down with thin clay grout. The setting had actually worked 1160 days, and had carbonized 22,650 tons of coal, under 21 p.ct. steaming condition. The average throughput of each retort was 2831 tons, or 2·44 tons per diem. The fireclay blocks at the bottom of the retorts were in good condition, with the exception of roughness created by shallow surface cracks. The silica segments were in excellent condition right up to the portion corresponding to the hottest zone of the retort. Here some of the sections were worn thinner than the remaining portion of the retort to the extent of ¾ in. The worn sections were taken out, and replaced with new which were actually fitted and bedded in silica clay. The top fireclay sections had surface cracks, and a rather rough face, this being due mainly to the spalling action of the wet coal; otherwise they were in good condition. The joints of the segments were on the whole quite sound, but it was necessary to rake out a portion of these to the tongued portion of segment, and plug with stiff silica clay. The whole cost of putting this bed into excellent condition was approximately £45. Since the repairs have been carried out, this setting has completed 220 days' further service, and is still in good condition. The effective repair of small holes and cracks in hot retorts has been obtained by the use of a fine silica clay (similar in composition to the retort material), to which 0·25 p.ct. of silicate of soda is added.

UTILIZATION OF WASTE HEAT.

A small vertical waste-heat boiler, made by Messrs. Spencer-Bonecourt, Ltd., London, is used on one of the settings, and has been working for two years. Portions of the steel chimney and lining were cut away for the waste gas connections to and from the boiler. A main chimney-damper is fixed between these connections. The diameter of the boiler is 2 ft. 6 in., and over-all height 10 ft. 10 in. There are 74 tubes in the boiler, each 6 ft. 9 in. long, 1½ in. internal diameter, and 10's gauge. The tubes are expanded in the top tube plate, and seated in the bottom. The total heating surface of the tubes and end plates is 205 sq. ft. The temperature of the inlet gases is 940° C.; and of the outlet, 400° C. The evaporation of the boiler is 520 lbs. of steam per hour. Town water is supplied to an overhead tank, from which the supply to the boiler is pumped by a small Worthington pump, automatically controlled by Messrs. Trist's "Thermofeed" arrangement. Inspection of the water-line is made at short intervals by the stokers. The steam generated is connected to the main steam supply at the base of the retort-house. Provision is made for cleaning the boiler, and this is done every six weeks. No mechanical difficulty has been experienced. Owing to the boiler being small in size, it has been necessary to by-pass some of the waste gases by opening the main chimney-damper. The erection of a similar boiler, of larger capacity, is now in progress, and this has an evaporative surface of 594 sq. ft., and it is anticipated that it will give 800 lbs. of steam per hour. The installation of further waste-heat boilers is probable in the near future.

DISCUSSION.

The CHAIRMAN commented upon the reduction of labour in the working of vertical retorts; this was apparent, he said, by a study of labour costs. In regard to fuel, it was essential that close attention should be paid to the question of coke quality in view of the important place it had in gas-works balance-sheets. Coke was a source of considerable revenue, and, like the gas itself, demanded the closest consideration. He agreed as to the ill-effect of dust in coal on carbonization by reason of the detrimental effect on heat penetration. He would like to know how much ammonia was allowed to pass the washers. He supposed that the wearing on the silica settings of the retorts was on the inside owing to abrasions. Was clinkering necessary with the step grates?

Mr. L. H. THOMAS (Nechells), in moving a vote of thanks to the author, expressed the opinion that, on account of the hot gases from the vertical retorts, it would be necessary to clean-out the retort-house governor more often than once every three months.

The resolution was seconded by Mr. E. H. WRIGHT (Wolverhampton), who commented upon the different qualities of coal that were supplied. At Wolverhampton recently they had received some small-size coal which stuck badly. It was difficult to deal with, and might have to be used with rougher coal. It struck him that the moisture in the coke was very low, because at Wolverhampton it was equal to something like 10 p.ct. He congratulated Stafford upon its tar yield; and he agreed that the naphthalene in the gas was also very low. As to the pitching of mains, a little trouble had been experienced in this direction at Wolverhampton, but the foul mains were flushed with liquor with satisfactory results.

The CHAIRMAN: What was the effect on the ammonia?

Mr. WRIGHT: We have not found any loss.

Mr. F. A. JENKINS (Leamington) stated that the percentage of floating breeze was very small at their works, though the ash content at Stafford was considerably less.

Mr. G. H. GEE (Birmingham) inquired if any trouble was experienced in separating the tar from the liquor.

Mr. G. CURRIER (Smethwick) expressed the opinion that the usual period for relining the governors was about two years. He asked if there was any tar or liquor circulating through the foul main, or whether it was a continuous circulation of tar and liquor? As to the waste-heat boiler, had any trouble been experienced by the condensation of gases during the starting or shutting-down of the boiler?

Mr. A. R. MYHILL (Birmingham) thought the result in relation to the naphthalene content was excellent. He would like to know whether the gas, with its average calorific value of 437 B.Th.U., was enriched.

Mr. L. S. ADLINGTON (Worcester) stated that there was an intention to reorganize the carbonization plant at Worcester, and it was quite possible that vertical retorts would be adopted. The right type of coal was absolutely necessary. He did not regard the amount of ammonia obtained as small. They were short of purifiers at Worcester, and in the near future they would be adding another oxide box. They had adopted a similar plan to Stafford in letting a little ammonia go forward. He considered the comparative freedom from naphthalene most satisfactory, and he thought they would like to know later on what was the experience with the rotary meter.

Mr. H. R. HEMS (Birmingham) desired to know, in view of the varying temperatures, what were the instruments used, and whether any special arrangements were made for determining temperatures.

Mr. MILLINGTON (Birmingham) expressed the opinion that the vacuum, while uniform, was very small on each setting and retort.

Mr. POULSON, in acknowledging the vote of thanks, and replying to the discussion, stated that no other type of step grate had been tried. He could not imagine any other kind giving more satisfactory results. The amount of real clinkering was very slight indeed; the bulk of the ash was small. The coals most suitable for carbonization were 1 in. to 1¼ in. nuts, and at Stafford they were mostly 1 in. As to moisture in the coal, the washing was carried out thoroughly, and the time taken to deliver the coal was so small that it would be difficult to arrange a supply with less moisture content. This was taken into account when the contracts were made. The colliery agreed that the moisture was high; but on the other hand they pointed out that the washing was efficient and the ash content low—in other words, one balanced the other. It was to be regretted that any ammonia was admitted to the purifiers. When they considered that the purifiers were only between one-third and one-half their proper size, it became a matter of vital importance to give clean gas. The amount of ammonia admitted was about 7 grains; the amount at the outlet was about half-a-grain. As to coal quality, his experience was that the better the coal the better the results, although best-quality coal was not an absolute necessity. During the strike they received material that could only be known by the name of coal probably because of its colour. Some of it when heated in the retorts broke down into fine dust, and difficulty was experienced in extracting it, as it ran through the worm like quicksilver. They also used fine quality coking slack during the same period, and some of it contained 21 p.ct. of moisture. This clung together and hung-up in the small hoppers over the retort. The addition of 30 p.ct. of breeze proved advantageous. The amount of air admitted to the purifiers was from 1½ p.ct. to 2¼ p.ct., and that was made effective by keeping the temperature of the purifiers at about 75° Fahr. They would be relieved of great anxiety when the new purifiers were put in; then they hoped to get the ammonia increased appreciably. No difficulty was experienced in the separation of tar and liquor. They had extended their tar and liquor wells; and it was anticipated, with the extra room given in the new storage wells, they would be able to increase their make of sulphate. Not much difficulty was experienced with regard to fuel "hanging" in the retorts; their heats were at the top of the retort. Carbonization was complete before the coal got far down. If it did not take place until the coal got to the bottom, sticking was likely to take place there. As to vacuum on each setting and retort, about one-tenth of an inch was used. This was sufficient for moderate steaming. It was not necessary to clean the governor more often than once every three months. They really overhauled the governor as much for cleaning and lubricating as anything else; anything up to ½ cwt. of deposit might be found in the bottom of the fittings, but no more trouble than that was experienced. As to the

calorific value, there was no enrichment of the gas. The calorific value was taken by recording calorimeters. The instruments used for taking temperatures were the Lunette (French), and the Cambridge Scientific Instrument Co.'s pyrometer. No trouble was experienced with the waste-heat boiler.

The meeting then terminated.

VISIT TO MESSRS. STEWARTS & LLOYDS.

On Wednesday last, between thirty and forty members of the Association visited, at the invitation of the Directors, the tube works at Coombes Wood, of Messrs. Stewarts & Lloyds Ltd.

Messrs. Truman and Williams conducted the party round the works, and no difficulty was experienced in appreciating the various processes of tube manufacture. The operations in the fittings shop were also followed with close interest. The butt-welding shops were next visited, and in the stamping shop the party saw huge hammers at work stamping out flanges of all sizes. The process of electric welding made a strong appeal. The visitors had an opportunity of inspecting tubes in course of manufacture, of sizes ranging from ⅛ in. up to 4 ft., all of which are tested up to 5 to 600 lbs. per sq. in., so that they are likely more than to satisfy all gas-works requirements. These are normal testing pressures, unless specially required for hydraulic work, when a 3000 lbs. test may be required. Nearly 3000 men are employed at the works.

The party were greatly appreciative of the facilities afforded, and at the close their thanks were extended to the Directors.

An Emergency Main-Repairing Job.

Particulars are given in the "American Gas Journal" of a prompt piece of work by the Public Service Gas Company, involving an engineering job of a rather unusual kind in connection with the repair of approximately 200 ft. of 16 in. gas-main over some meadows near the Seaboard Bye-Product Coke Company. The desire was, of course, to maintain an uninterrupted flow of gas to the consumers; and this was successfully accomplished. For the past six years the Gas Company have depended upon the Seaboard Company's plant for a considerable portion of the gas supplied to several of their districts; and since 1920, when the Seaboard Company increased the capacity of their plant, the maximum amount of gas available for public service has been 24 million c.ft. per day. This coke-oven gas from the Seaboard plant is carried under the Hackensack River to the gas-works in Jersey City, where it is mixed with water gas made there, and then sent across the meadows and under the Passaic River to Newark. Recently it was discovered that about 100 ft. each of two parallel pipe-lines were being eaten away by some kind of acid, and quick action was necessary to avoid cutting off the supply. A longer coffer-dam was built, and the water pumped out, so that workmen could have a dry space in which to make the repairs. Four duplicate pumps were installed, each handling two 4 in. streams, or 1000 gallons a minute. It required, to renew these sections of pipe, a force of sixty men working day and night shifts for five days.

Portable Coal-Sample Crushing Apparatus.—The collection of samples from tipples for the various coal exchanges, performed by the United States Bureau of Mines, showed the need of a portable coal-crushing and sample-reducing plant, to obtain mechanically a laboratory sample from the gross sample. A sample-crushing plant mounted on a Ford truck has been constructed, and will be tested in connection with the fuel economy survey now being conducted in the district of Columbia.

Reports Held-Over.—In spite of the unusual bulk of this week's issue of the "JOURNAL" and the "GAS SALESMAN" Supplement, it has unfortunately been necessary to hold-over until the next number no less than three papers presented at recent association meetings. There is the paper (and discussion) on "Lighting and Burners," by Mr. F. V. Barnes, of Todmorden, which formed part of the business at last Saturday's meeting of the Manchester District Institution of Gas Engineers. Another is Mr. W. H. Warren's contribution on "Retort Vacuum and Quality Control" to the proceedings of the London and Southern District Junior Gas Association, with the discussion; and the third is an abstract of the paper entitled "Consumers' Complaints and Inquiries," which was read by Mr. W. H. Sainsbury, of Truro, before the Cornish Association of Gas Managers.

Distilling Oil from Coal.—According to the local correspondent of the "Financial Times," Prof. Kling, Director of the Paris Municipal Chemical Laboratory, expresses his belief that science is within reach of solving the problem of transforming coal at the pit's mouth into hydrocarbonated liquids. If brought to a practical commercial point, this will absolutely revolutionize the colliery industry and radically affect all other industries. Prof. Kling does not claim that all the difficulties connected with the problem have been overcome, or that the time has yet arrived to transform coal by the process into motor petrol as a profitable commercial proceeding; but he believes that the recent discoveries and experiments of such men as Dr. Fischer, Director-General of the Kaiser Wilhelm Institute, of Mulheim, on the Kuhr, his assistant, Herr Schrader, and of other scientific chemists, make the solution of the problem a certainty within a reasonable period.

YORKSHIRE JUNIOR GAS ASSOCIATION.

A Meeting of the Yorkshire Junior Gas Association was held on Feb. 17 at the Board Room, Leeds Road, of the Huddersfield Corporation Gas Department, by permission of the Gas Committee and of Mr. H. Singleton, Engineer and Manager. The PRESIDENT of the Association (Mr. H. L. Bateman, of Wakefield), occupied the chair, and there was a very good attendance.

Mr. E. L. OUGHTON (Huddersfield Gas Department) read a paper on:

SUBJECTS AND PROBLEMS ASSOCIATED WITH THE DISTRIBUTION AND UTILIZATION OF GAS.

This paper is intended as a stimulus to the younger members of the gas industry training for the sales and distribution departments, to equip themselves thoroughly in the early stages of their careers. May the following examination of the diverse subjects and problems which present themselves in many phases in connection with the supply and use of gas, emphasize the great need for taking the wider view in their training. Theoretical knowledge and practical training must go side by side, or the alphabet of real progress will be reversed, with resultant confusion.

This has been demonstrated in a very real way to the writer during several years of teaching gas distribution and fitting, for men second to none in knowing "how" to do the work, have utterly failed when asked "why" at an examination. The ground work of any technical industry is not learned in a few months of even intensive work, but calls for patient study in many theoretical subjects before the technical subjects can be thoroughly mastered. The minutes of the English Joint Council of Junior Gas Associations during the past few years bear evidence that the Juniors themselves have not been idle in this very important matter. When—if ever—the details of the preliminary work at the inception of the education scheme for the training of those engaged in the technical work of the gas industry, as submitted to the Institution of Gas Engineers, become known, it will be found that the part played by the juniors had a very great bearing on the scheme itself. In view of this we should earnestly seek to show that we are not only worthy of, but necessary to, the working out of the scheme, and through it build a bridge of undeniable right for future association with the Institution of Gas Engineers itself. The hope is cherished that this paper may create a spirit of inquiry in all problems which we come across in our work. Also may there be the necessary theorizing to ascertain "why" in all cases of failure or defect in materials and appliances.

DISTRIBUTION OF GAS.

The problem as to the type of mains to be laid is one that calls for serious consideration. Some years ago elaborately prepared pamphlets were circulated among gas and water undertakings, giving the case for cast iron as against steel for mains. The arguments seemed irrefutable unless one knew the exact conditions under which the defaulting steel mains were laid, which of course altered the case. Cast-iron mains have fully established their claim to durability for low-pressure use, while the new Stanton de Lavand centrifugally spun cast-iron pipes promise a new lease of life, owing to the 25 p.ct. reduction in thickness, yet with a correspondingly increased density of the metal, and so durability. Steel mains with welded joints have an undoubted advantage when the subsoil is normal, as all leakage due to drawn joints is eliminated. With high pressure over 5 lbs. per sq. in., one only thinks in terms of welded-steel mains. The maintenance factor cannot, however, be ignored where the ground is often opened up from various causes. In one case the writer found nearly a score of places where the jute covering had been damaged by picks, when a new drain to a house was laid on the track of the steel main. How many are conversant with the constituents of the metals of which the mains are made, and the value of the various tests to which the metal and the finished pipes are submitted?

According to the American Automotive Engineers' specification, cast iron for mains should be made from the best tough grey pig iron, and not burnt. Those with experience in main laying realize the importance of good metal, and the trouble caused when a branch or split tee has to be inserted in existing pipes when the metal is chilled or brittle and so hard as to ruin cutters and cup drills. The vertical casting of pipes, sockets downwards, ensures maximum density at the socket and equal distribution of the metal. The centrifugally spun pipes before-mentioned give a general increase of density. The distribution of gas at low pressure commences at the holders, which may give pressures up to 10 in. water-gauge, which is then reduced at the station-governor to meet the needs of the district. The available pressure at the consumer's meter is subject to altitude, friction loss in mains and services, bends, elbows, and also incapacity of mains for maximum demand. The application of Dr. Pole's law and its various transpositions will solve the question of an adequate low-pressure supply to the district, if the well-known points of error in the formula are remembered.

High-pressure gas supply will meet every requirement however varied, from filling a holder throwing a greater pressure than one from which it is being filled, or the boosting of districts permanently short of pressure due to inadequate mains, to the future ideal of complete high pressure direct to the consumer. The

range of pressures varies from 6 in. water-gauge to 100 lbs. per sq. in. American distributing engineers are looking forward to the transmission of gas at a pressure of 1000 lbs. to 3000 lbs. per sq. in. One authority has given the following formula for ascertaining the power needed for raising the pressure:

H.P. = 0·05 hV.
Where H.P. = B.H.P.; h = gauge pressure in inches.
V = cubic feet per hour (in thousands).

The following types of compressors are available to meet the diverse needs of high-pressure distribution: Fans; positive, rotary, and reciprocating (single to five-stage) compressors of various designs. The Mitchell automatic booster for high-pressure lines (Drew, Bear-Perks) is a new idea, and more will be heard of it. The question arises, What type ought to be used, and why? There is always a technical reason for the adoption of any particular type. Take a simple example. Why should an isolated district be always short of gas owing to an abnormal growth of demand, when a gas-engine or motor-driven fan may be fixed to boost the trunk main for that area, and increase the pressure as required? It must always be remembered that an adequate supply is far more economical than a continual shortage of gas when most needed, for the initial cost of securing this, in the majority of cases, will be written-off in the reduced cost of attending to complaints, and the increased consumption.

Gas Measuring Apparatus.

The student will find it an interesting study to examine theoretically the various types of meters, carefully noting their diverse construction and principles involved. The ordinary low-pressure wet and dry meters are generally understood, and involve no intricate problems; yet the different mechanism of valves, prepayment devices, diaphragms, &c., are well worth careful thought, especially if those of German or American origin are available. In high-pressure meters the different methods adopted in the compensating arrangements for various pressures should be known. Inferential or proportional meters are very different in design to achieve the same purpose—viz., the Gas Meter Company's, Parkinson's, Thorpe's, and American types. The Thomas electric meter involves totally different principles to the foregoing types, in that the gas passes through an electrically heated wire resistance which is maintained at a definite temperature, increased current being needed when a larger volume of gas passes or *vice versâ*, the current used being calibrated to read cubic feet. The rotary meter, involving the anemometer principle, is perhaps better known. The Kent & Hodgson venturi types of meters are based upon rather involved formulæ which are far too often neglected in the study of gas-measuring apparatus.

Light.

From the theory of light to the fixing of an incandescent burner is a long journey, yet if there is to be correct lighting, the basic principles of light should be known, and the theoretical side of illuminating engineering must be applied in every class of lighting for the home, factory, church, public buildings, and street lighting. The generally accepted theory of light is that it is a form of wave motion. Light waves move through the ether at the rate of 186,000 miles per second, the wave lengths varying according to their colour, from about fifteen millionths of an inch for violet rays to twenty-seven millionths of an inch for the red rays. The frequencies of these waves run into billions of times per second. Their energy may result in heat, light, or actinic rays. These rays always travel in straight lines, either parallel, convergent, or divergent. It will be noticed that these laws apply to the emanations of radiant energy. The following brief definitions occurring in the study of light may not be superfluous. Refraction takes place when the light rays pass through one medium into another, as through water or glass. Diffraction is the bending of light, to a small extent, round obstacles in the path of the waves. Dispersion is the separation of the different colours of the spectrum. When two similar sets of waves come up to the same point, they do not simply add themselves together, but interfere with one another. This inter-action is termed interference. Polarization is a particular modification of rays of light by the action of certain media or surfaces, so that they cannot be reflected or refracted again in certain directions.

The spectroscope is an instrument for obtaining a spectrum. It consists of a telescope for viewing the spectrum, and a collimator which has an adjustable slit at one end for governing the breadth of the parallel rays passing through a convex lens at the other end. Between these a prism is placed which analyzes the light projected upon it. Owing to the different spectra of various light sources as shown by the spectroscope it is possible to construct lamps having certain media which correct the light to the daylight spectrum and so enable the matching of colours to be undertaken by artificial light as well as in the daylight. Satisfactory lamps are now on the market for this purpose.

Photometers.

The illumination of buildings and streets is far too often carried out by rule-of-thumb methods, with the result that the lighting is inefficient and often wasteful, whereas if scientific calculations are made, perfect illumination at minimum cost is effected. It is an education in itself to take readings of many existing installations, whether indoor systems or street lighting, and note the candle power of the light source and then the actual illumination. The evil of casual methods in lighting is thereby emphasized and the needed lesson learned. The photometers for measuring the candle power of the light source and the actual illumination are similar in design and principle, but differ in calibration. A clinometer may be used for measuring the angle of the light ray when taking candle-power readings of lamps at various angles for the purpose of plotting polar curves. Lambert's cosine law is often a stumbling block to students, but where there is a knowledge of trigonometry this is obviated. The cosine law is necessary when the surface illuminated is not in the normal plane of the light ray.

Radiant Heat.

The radiations of light and heat are similar. The energy of the longer rays falling on the body are absorbed and converted into heat, the shorter waves coming into contact with the eye give the sense of light. Heat is transferred from the source by radiation, convection, and conduction.

Radiant heat or energy has the following characteristics—

(*a*) May pass through transparent bodies; this is termed diathermancy.
(*b*) Is reflected by polished surfaces.
(*c*) Is absorbed by dull black surfaces.
(*d*) Does not heat the medium through which it passes.

It must be noted that good reflectors are bad radiators, while good absorbers are good radiators. The Wilsons and Mathiesons "Advance" cooker has not the usual slag-wool packing, but the oven sides have a polished plate fixed between the oven linings and the outer air-chamber, which reflects back the heat transmitted through the oven lining, the outer space acting as an air insulator. The modern gas-fire owes its high efficiency to the increased radiant energy emanating from the higher temperatures obtained in the incandescent radiants. Also the surface combustion method of heating utilizes the radiant energy from the high-temperature granular diaphragm. The value of a high-temperature heat source is explained by Stefan's Law which shows that "the amount of heat radiated per second by a full radiator is proportional to the fourth power of its absolute temperature."

Radiant energy is absorbed and converted into heat when the rays fall on to a perfectly dull black surface. Prof. Langley's bolometer consists of a fine strip of blackened platinum, which when placed in the direct rays is heated by them, and the temperature rise is ascertained by measuring the electrical resistance of the platinum wire, which varies with temperature. Other methods of measuring radiation are the thermopile, radiation calorimeters, and various types of radiometers.

Joule's Equivalent.

Joule's mechanical equivalent of heat shows that 778-779 foot-pounds of work are expended when 1 lb. of water is raised through 1° Fahr. The specific heat of a substance is the ratio of the amount of heat required to raise a given weight of the substance through 1° Fahr. to the amount of heat needed to raise the same weight of water through 1° Fahr. The specific heat varies in certain metals at different temperatures. Its application is necessary when calculating the amount of heat required in the heat treatment of metals, warming rooms, and heating liquids other than water. The formula used is as follows:

To bring the substance to the equivalent of water—
Let X = the weight of substance in lbs.
Y = the specific heat of substance.
Then X × Y = the water equivalent.
(1 B.Th.U. raises 1 lb. of water through 1° Fahr.).
Tables of specific heats may be found in most text books.

Vapour Pressure—Latent Heat—Hygrometry.

The vapour given off from a liquid during evaporation exerts a pressure on the liquid. Liquids which evaporate quickly have high vapour pressures which become equal to that of the atmosphere at the boiling point.

Data Relating to Water (Box).

Vapour Pressure of Water in Inches of Mercury.	Variations in Weight, Specific Gravity, and Volume at Various Temperatures.			
	Temperature ° Fahr.	Weight of 1 C.Ft. in Lbs.	Specific Gravity.	Volume.
At 32° Fahr. = 0·181	40	62·4	1·0	1·0000000
50° ,, = 0·361	62	62·32	0·9986	1·0014070
104° ,, = 2·162	102	61·92	0·9921	1·007911
176° ,, = 13·962	172	60·72	0·9729	1·02788
194° ,, = 20 687	192	60·28	0·9659	1·03526
212° ,, = 29·921	212	59·82	0·9585	1·04333

In the change from the solid to the liquid state a large amount of heat is absorbed, yet the temperature is unchanged, as also when liquids are changed to the gaseous state. The heat imparted to cause this change of state without the change of temperature is termed latent heat. In converting 1 lb. of ice to water, 142·4 B.Th.U. are absorbed, while in the further change from water to steam 966 B.Th.U. are absorbed.

The temperature at which the air becomes saturated with the moisture present is called dew point. Assuming the temperature is 68° Fahr., and the dew point recorded on the hygrometer is 54° Fahr., as the maximum pressure of water vapour at 68° Fahr.

is 0·685 in. water gauge and the maximum pressure at 54° Fahr. is 0·418 in.

Then $\frac{0{\cdot}418}{0{\cdot}685} = 0{\cdot}61$, which is the relative humidity,

or shows that the air contains 61 p.ct. of its possible amount of water vapour. The Kata thermometer (Dr. Leonard Hill) is an apparatus for determining an ideal state of the air of a room in regard to its heating and ventilation. It consists of two large-bulbed spirit thermometers, one of which is covered with a cotton bag. The two thermometers are plunged into water until the temperature rises above 110° Fahr. They are then removed and suspended in the air, the uncovered or "dry" bulb is then dried, and the surplus water is shaken off the cotton covered "wet" bulb. The temperature drop from 110° to 100° and again from 100° to 90° Fahr. is timed by a stop watch. The time in seconds is taken, and by a given factor is converted to heat loss by radiation, convection, and evaporation. The difference between the readings of the wet and dry bulb give the evaporation loss.

Power.

The modern four-cycle gas-engine has a thermal efficiency of 25 to 30 p.ct. In view of the varied opinions as to the calorific value of town gas and the use of coke-oven gas, and the competition with suction and power gases, the following calculations show how to arrive at the gas consumption in cubic feet and therms per B.H.P. (I.H.P. less the friction loss in the engine itself).

1 B.H.P. = 33,000 ft. lbs. per min.

∴ 1 B.H.P. hour = 33,000 × 60

778 ft. lbs. = Joules equivalent for 1 B.Th.U.

∴ 1 B.H.P. hour = $\frac{33{,}000 \times 60}{778} = 2545$ B.Th.U.

or $\frac{2545 \text{ B.Th.U.}}{100{,}000 \text{ B.Th.U. (1 therm)}} = {\cdot}0025$ therm.

These figures are purely theoretical, for in practice the thermal efficiency varies, and the actual result must be in accordance with thermal efficiency. The thermal efficiency of an engine is the percentage of heat in the gas used which is converted into work. The following tables give the gas consumption in gas-engines with 30, 27·5, and 25 p.ct. thermal efficiencies respectively, in c.ft. per B.H.P.

Calorific Value of Gas.	C.Ft. per B.H.P. at 30 p.ct. Thermal Efficiency.	C.Ft. per B.H.P. at 27·5 p.ct. Thermal Efficiency.	C.Ft. per B.H.P. at 25 p.ct. Thermal Efficiency.
500	16·96	18·51	20·35
475	17·86	19·48	21·43
450	18·86	20·57	22·63
425	19·96	21·78	23·95
400	21·20	23·14	25·45
375	22·62	24·68	27·15
350	24·24	26·44	29·11
300	28·28	30·85	33·94
250	33·94	37·02	40·72
200	42·42	46·28	50·91
150	56·56	61·70	67·87

To obtain the required B.H.P. of a gas-engine to drive a dynamo of a given output, the following will help:

Assuming the output of the dynamo to be 10 kilowatts and the efficiency, including loss in belt drive, to be 86 p.ct.

Then, as 86 : 100 : : 10 : x.

∴ $x = 100 \times 10 \div 86 = 11{\cdot}6$ KW. required at engine.

As 746 watts = 1 H.P. and 11·6 KW. = 11,600 watts.

∴ 11,600 ÷ 746 = 15·5 B.H.P. gas-engine needed.

Industrial Problems.

The old method of drying varnished or gummed paper, &c., was to place each sheet separately on a rack and then place in an oven. This was an expensive method both from the standpoint of labour and floor space. The new system in use is the "Bush" patent hot-air drying apparatus which has brought this process to a high state of efficiency. In this arrangement there is a Wilsons and Mathiesons heater for use with town gas, which consists of a series of combined pipes. In each pipe there is a gas-flame, the products coming out of the pipes into a separate chamber at the end, where they are conducted away. Therefore, the air blown from the fan passes over the gas-heated pipes without coming into contact with the products of combustion. The air is then conveyed to a conical box. Inside each box there are three rows of small holes. The hot-air is blown through these on to the paper as it comes from the varnishing machine, and as it passes along under the three boxes. When the sheets come out at the end they are quite dry, and can be placed one on the top of another ready for sending away. This is a great achievement, and the steady heat could only have been arrived at by either gas or water, and water could only be used in the form of steam, as the temperature required is 220° Fahr. In the case of playing-cards, it is not only necessary to dry the varnish by heat, but also to cool it after it has been heated, and in such cases another box is fixed at the end with a separate fan so that cold air may be blown on to the cards as they leave the hot chamber. The gas consumption is between 75 and 100 c.ft. per hour according to the nature of the work.

Gas for Brewing and Other Industrial Purposes.

We have batteries of the well-known and highly efficient Davis self-intensifying burners fixed under large copper caramelllzing pans, for treating the sugar before it is mixed with the beer in the process of brewing. These pans were formerly heated by coal-fires. With gas-heating much labour and space is saved and the process accelerated, with more uniform results. The gas consumption is approximately 180 c.ft. per hour with 80-gallon pans. There is also a battery of similar burners consuming 1500 c.ft. per hour, fixed under a 3000-gallon vat, which is partially heated by internal steam pipes and coils. Coal was formerly used in this case. In another installation we have three large rooms, which are used for a fermentation process in the making of wines, efficiently heated by gas steam radiators to 90° Fahr. This temperature has to be maintained within very narrow limits continuously until the process is completed, and very often over the week-end. The maximum temperature is governed by Potterton's air thermostats, and it is also proposed to fix safety taps which will not allow gas to pass, should the supply fail from any cause, until the tap has been first turned off and then on again. The description of this tap appeared in Vol. I., No. 6, of the "Gas Salesman."

We have in hand the conversion of low-pressure gas and air blast burners under sugar boilers to surface combustion radiophragm heaters. As no secondary air is needed for combustion with these heaters, they are entirely encased, thereby giving the minimum loss of heat. The Radiant Heating Company, London, have also a griller fitted with radiophragm heaters as above. We have one fixed which is giving every satisfaction. The griller is of the vertical type, the two sides being fitted with radiophragms which become incandescent when heated up. The food to be grilled is clamped in a grid and suspended midway between the heated surfaces. The grilling is done very quickly, and the resultant flavour is considered equal to the time-honoured coke grill. The air blast (3 to 4 in. water gauge) is obtained by a motor-driven fan.

Centrifugal Clutch for Gas-Engines.

In an engineering works in the town, where machines are driven by a gas-engine, a new type of clutch has recently been fixed which does away with the need of loose pulleys, or the old dangerous method of slipping the belt. A brief description may be interesting. The clutch consists of a centre hub in cast iron with steel arms, sliding on which are shoes made of cast iron or aluminium which can be suitably weighted according to the particular duty to be performed. Each shoe is shod with non-inflammable asbestos fabric. For heavy duties the clutch shoes are operated by a weighted lever so arranged as to increase the pressure of the shoe on the drum, and consequently the driving capacity of the clutch or pulley. In action the shoes are thrown outwards by centrifugal force and engage the inside of the rim (hitherto stationary) upon reaching the pre-determined speed. For the gas-engine above mentioned, running at 150-200 revs. per min., the clutch is spring loaded to enable the engine to attain a comparatively high speed before the clutch operates. The makers are "Centrifugal Clutches, Ltd., Huddersfield."

Fish and Potato Ranges.

These are in a class by themselves in comparison with other trade and industrial uses of gas, yet as sources of revenue to the gas undertaking they are most important. In Huddersfield about 80 p.ct. use gas, and when it is remembered that ranges consume 300 c.ft. to 500 c.ft. of gas per hour when in full use, they are not to be despised. While coal-fired pans may be cheaper in fuel charges alone (and this is all that can be said in favour of coal) against this is the greatly increased labour and dirt with the latter. There is, however, a greater drawback to coal than even these—this is the loss of fat during the time the range is in use. A customer in our area of supply using a "New Triton" range which is solely designed for gas fuel, made by Proctor, of Slaithwaite, Yorks, estimated that his saving with a four-pan "Triton" gas-range was no less than £1 per week, and the approximate cost of frying four parts potatoes to one of fish came out at 1¾d. per stone with gas at 3s. 6d. per 1000 c.ft. It is impossible to give an all-round figure for cooking costs, as the ratio of potatoes to fish varies in nearly every case, from equal parts to seven of potatoes to one of fish. In a recent test made we found the working temperature of fat to be 370° Fahr., and immediately after the potatoes were placed in for frying, the temperature dropped to 266° Fahr. This shows the necessity of having a margin of heat in the burners to bring the fat quickly up to the correct temperature. The use of oil burners is being advocated largely in some districts, but they do not give such uniform heat control. Storage is needed for the oil in addition to a pressure tank for supplying the vaporized oil to the burners, which themselves are far more complicated than gas-burners; and when they need regulating and the injector nipples cleaning, the flavour and smell of paraffin is very liable to be added to that of the fish and chips. Electric heating for these ranges works-out at about five or six times the cost of gas for equal duty, and the initial cost of installation is three or four times as great.

Relations of Gas Undertakings with Plumbers.

This phase of "problems associated with the use of gas" cannot be overlooked in a progressive undertaking. Master plumbers may be either good friends or formidable enemies to the progress of gas sales. For success there must of necessity be the focussing of two very diverse aims. The plumber's interest is centred around the fact that when an appliance is fixed his only source of revenue from that appliance lies in maintenance or renewals. The

gas undertaking's interests include both those of the plumber's, but with the infinitely greater interest, the use of gas as a continual source of revenue, which will surely follow in the wake of good service. The master plumbers should not be cut out entirely, but reasonably controlled. In Huddersfield the plumbers have amicably agreed to work to regulations and specifications, as to size of pipes and fixing of appliances with proper flue outlets; all work to be subject to inspection by the Gas Department. It must be noted that the attitude of corporation gas departments towards plumbers necessarily differs from that of companies.

[The discussion on the paper will be published next week.]

MESSRS. FALK, STADELMANN & CO., LTD.

New Showrooms in Birmingham.

On Tuesday of last week Messrs. Falk, Stadelmann & Co., Ltd., the well-known makers of the Veritas mantle and of several other gas-burning appliances which need no introduction to our readers, opened new showrooms at Nos. 81-84, Lionel Street, Birmingham. Their headquarters are in Farringdon Road, London; and an extensive business is also conducted in Glasgow and Manchester. We were able to visit these premises two days after the opening, and found there a great deal of interest, not only in the showrooms themselves, but in the extent and the organization of the warehouse. Nos. 81-84, Lionel Street, originally constituted the machine-tool shops of Messrs. Ward, Ltd.; and some idea of the size of the place may be gathered from the fact that the main showroom floor alone covers an area of 4000 square feet. The work of conversion has been planned by, and carried out under the supervision of, Mr. Hunt, the branch manager, to whom great credit is due.

The 4000 square feet referred to have been divided by handsomely decorated wooden partitions into a number of rooms, four of which are devoted exclusively to gas-fittings. In the first of these rooms is a show-case of Veritas mantles; the exhibits being lighted by four opal-glass topped fittings with special high-class bead coronas. Near by is set out a number of gas-fires; and we were informed that Messrs. Falk, Stadelmann are now in a position to offer these on the same terms as manufacturers, owing to arrangements recently concluded with a firm of makers. A "Parabola" heater—consisting of a refractory element set in the centre of a polished-copper parabolic reflector—was also asserting its presence in this room. A variety of artistic ceiling pendants was in evidence. The latter applies also to the second room; but here a special feature was a two-light semi-indirect fitting, in which the bowls are suspended from short chains on the brackets. A "Wizard" heater was functioning in this room—its horizontally disposed element and perforated casting has been described in our columns—and the two rails above it, for supporting utensils, were pointed out to the writer. No flue was fitted, it being maintained that such is unnecessary; and we must testify to the freshness of the room. A flue-pipe can be supplied, however, if preferred.

In the third room we made the acquaintance of the "New Mentor" cooker, which is portable and has found a ready sale for working-class and for small modern houses. The smallest size is constructed in sheet iron, and the design is ingenious. In the base is a gas burner which heats the oven portion; and from the oven the hot gases pass through vents and perform useful service, first for boiling and then for simmering, before escaping through a small outlet (to which a flue may be fitted) in the back. The portion of the top plate not occupied by the boiling and simmering rings contains a ring griller. The oven door is glass-panelled; and it is easy to understand the popularity of the little cooker. The wide range of burners and fittings is in continued evidence throughout, and types of artistic statuettes attracted attention. In the fourth gas room were examples of the "Ukay" exterior fitting, the details of which are too well-known to warrant further elaboration. There is a comfortable waiting room on this floor, the remainder of which is replete with many things—from bell-pushes to the completest wireless outfit. On the ground floor are the office and a large showroom devoted to paraffin lamps.

THE WAREHOUSE.

Enormous as is the capacity of the warehouse, orderliness and organization have added to its utility. The first floor is given entirely to gas appliances, which include forty types of incandescent mantle, flexible tubing, burners, pendants, brackets, &c. Four-foot shelves are made for the pendants, and abutting these and facing the next range of lockers are two-foot shelves for the brackets; and the ranges of lockers are so placed that a window comes between adjacent sets. The other floors accommodate electric and paraffin fittings, and spare parts.

On the ground floor is every type of glass globe, the electric lamp and shade stock, and the unpacking and packing rooms. These last two rooms evidence the care with which the depôt has been organized; a feature being that all outgoing goods are easily concentrated in the packing room, and handled to the lorries. On the other side of the yard, scores of large cases hint at the amount of business carried on at this branch.

Messrs. Falk, Stadelmann are to be congratulated on the work carried out so ably by Mr. Hunt and his staff.

NEW COKE-OVEN AND PRODUCTS PLANT AT PELTON.

New and up-to-date plant has been installed by the Stella Gill Coke and Bye-Products Company, Ltd., of Milburn House, Newcastle-on-Tyne, at Pelton (co. Durham); and it is expected that work will be started there early next month. The Company will handle about 12,000 tons of coal per calendar month, and for the time being some fifty or sixty men will be employed.

The coal will be first dealt with in the Baum coal washer, which will wash at the rate of 75 tons per hour. Afterwards it passes into the draining bunkers, which, like the washer, are constructed of ferro-concrete. The coal is allowed to drain to reduce the moisture content to as low a proportion as possible, and then it is dropped into a boot and passed, by means of an elevator, through a Carr's disintegrator to a storage bunker 113 ft. high. This storage bunker is also constructed of ferro-concrete. From this the coal is delivered into a charging car constructed in four compartments, which conveys the coal to any oven in the battery. This consists of fifty regenerative ovens, of the vertical-flue type, Simon-Carvés principle.

The gas made is cleared of ammonia, tar, and naphthalene, and part is conveyed back to the ovens. To each oven there are five tuyères, which heat a number of vertical flues. The heat is reversible, and burns in one half of the flue for a suitable period, and then in the other, so that the full heat of the gas is delivered to each oven, maintaining an equal temperature throughout. The gas, after heating the oven wall, is collected in the main flue. In each main flue there are numerous chequer-work blocks constructed of fireclay material, which absorb the heat from the waste gases. After a definite time the flow of gas is reversed, and air is passed through the heated chequer-work, thereby economizing the heat. The quantity of gas which will be required for this purpose is approximately 50 p.ct. of the total produced. Part of the surplus gas will be used for raising steam, and the remainder for generating electricity.

The coke from the ovens will be discharged by an electrically driven ram on to a specially designed coke bench. The bench is constructed on an incline, and the coke is retained on it by a series of gates. As the coke is required to be delivered into wagons, the gates will be raised and the coke passes over screens direct into them. The coke is not handled by men or by mechanism, and breakage is thus reduced to a minimum. This bench is the first of its type erected in this country. The breeze screened from the coke can be further treated for disposal as fuel for producers, or for greenhouse or household use. The electrical plant consists of two 250-KW. alternators, constructed by Messrs. Belliss and Morcom, Ltd., and the British Thomson-Houston Company, the switch gear being by Beyrolles. The plant develops sufficient electrical power for the working of the whole installation, and for the lighting of the houses which have been built for the Company's officials and workmen.

From the amount of coal previously mentioned—12,000 tons per calendar month—7000 to 8000 tons of coke will be produced, together with 400 tons of crude tar, 120 tons of sulphate of ammonia, and 20,000 gallons of crude benzole. The bye-product plant is constructed to deal with double that quantity of coal, so that an extension of fifty ovens can be added without any other alteration being necessary. The question of the distillation of tar to produce creosote, naphthalene, anthracene, and pitch is also being considered.

The Microscope in the Gas Industry.—At a meeting this evening of the Royal Microscopical Society to be held at 7 o'clock at No. 20, Hanover Square, W., Mr. Thomas Terrell, Jun., will read a paper on "The Use of the Microscope in the Gas-Mantle Industry."

Southern Association of Gas Engineers and Managers.—We learn from the Hon. Secretary (Mr. W. H. Bennett) that the annual meeting of the Association will be held in the Connaught Rooms, Great Queen Street, W.C., on Thursday, March 22, at 2.15. The members will lunch together at 12.30.

Coke-Oven Gas Plant for Hamilton (Ont.).—Work is being commenced on the building of a bye-product coke-oven plant for the United Gas and Fuel Company, of Hamilton, Ontario; the contract having been placed with the Semet-Solvay Company. The plant will have a capacity of 7 million c.ft. of gas per day; and it is said that it will be the first of its kind in that country in connection with which the manufacture of gas and coke for domestic use is the principal object. Several large gas companies in the United States have under consideration the building of this type of plant; and during the past few months three contracts have been placed. It is the intention of the United Gas and Fuel Company to continue the use of all the natural gas that can be brought to Hamilton; but the desire to be in a position to assure an uninterrupted supply of gas for industrial as well as domestic consumers, has led them to arrange for a plant capable of filling all possible demands. The best grade of coke for metallurgical as well as domestic purposes will be produced; it being recognized that the use of coke, where good coke is obtainable, is superseding anthracite coal for house heating.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Cast-Iron or Steel Pipes in Gas Distribution.

SIR,—The recent explosions of gas in various parts of the country have brought to the fore the comparative merits of cast-iron pipes and weldless-steel mains, and the public is apt to draw conclusions that the latter are far safer. As a believer in the older and well-tried cast-iron pipes, which I have seen taken up in perfect condition after 60 years' service, one wonders if users of steel mains have asked themselves what is going on under the ground in these pipes from internal corrosion and oxidation.

The difference between the life of the old wrought-iron service pipes and the present pipes made of steel is very marked, and if the weldless mains are of the same material, the danger in the future will be very great. Granted that the steel mains are coated inside and out, I am afraid that with gas as at present manufactured, with its high CO_2 and oxygen content, internal oxidation will be a very serious factor. Reverting to the merits of iron and steel service-pipes, may I give a case which came under my observation a week ago, from which anybody can draw his own conclusions and act accordingly? Last year—to be exact, twelve months ago—I had occasion to make some alterations to a service-pipe which to my knowledge had been in the ground over thirty years. I found it in perfect condition and joined it up to the main again with a piece of steel steam-pipe. I found no oxide in the old pipe. Last week I had occasion to make further alterations, and on taking up the pipe, which had only been in the ground twelve months, to my astonishment I found it quarter full of bright-red oxide of iron, while in the old pipe there was still no trace of oxide.

It therefore appears to me that users of the present steel pipes are laying up for themselves terrible trouble in the future. I fear the same may apply to steel mains, and though at present the safety of steel may appear greater than that of cast-iron, the future may put the balance far the other way. I have made inquiries from makers of tubes, and cannot find any who will guarantee wrought-iron, though I feel sure there are such, and if gas companies fully realized the value of the wrought-iron over the steel, a supply would soon be forthcoming. The same remarks apply to holder sheeting. It seems now to be almost impossible to prevent oxidation in steel sheeting.

Bungay, Feb. 20, 1923. W. METHVEN.

"Deadly Gas."

SIR,—Enclosed is a cutting from the "Daily Mail." Is it not time the gas industry made it their business to send someone to represent them at these coroner's inquests, and not allow such men as these to make such statements? Perhaps you will call attention to it.

I think there should be someone appointed in each district to take these matters up immediately, and make full investigation and give evidence.

Newark, Feb. 24. C. B. TULLY.

[The enclosed cutting was entitled "Deadly Gas," and appeared in the "Daily Mail" of Feb. 24.—ED. "G.J."]

REGISTER OF PATENTS.

Process for making Prussian Blue, Starting from Coal Gas.—No. 181,719.

DESSEMOND, A., and DELCLÈVE, A. H., both of St. Etienne.

No. 16,603; June 15, 1922. Convention date, June 16, 1921.

The patentees, in introducing their process, state that the majority of the processes for the direct extraction of hydrocyanic acid from coal gas, for obtaining prussian blue as the final product, have failed because of the irregularity and the impurity of the collected products, of the low value of the same, and finally of the great expense for treating the dilute solutions obtained, which form large volumes of liquid. The perfect carrying-out of processes of this kind depends upon numerous circumstances of a chemical, mechanical, or physical order, which very considerably modify the results; and these, if one does not operate with great care and thorough precaution, are very far removed from success.

In fact, they say, all processes for the recovery of cyanogen from coal gas in the form of prussian blue appear to have been abandoned and replaced by the Bueb process, which permits of recovering in the form of a slime a mixture formed of a complex composition of iron, cyanogen, and ammonia. After extraction of the ammonia, filtration, and drying, there is obtained as the final product a bluish mass, containing 30 p.ct. of prussian blue, 44 p.ct. of ammonium ferrocyanide, and 4 p.ct. of ammonia, which is subsequently subjected to an appropriate treatment in special plant, in order that the products which it contains may be withdrawn therefrom at a sufficient degree of purity.

The patentees claim:

1.—A process for the direct preparation of fine prussian blue starting from coal gas, which consists in causing the gas to bubble through an alkaline ferrous mixture composed essentially of ferrous hydrate in suspension in a solution of alkali carbonate, in such a manner as to fix the cyanogen in the form of alkali ferrocyanide; in subjecting at a temperature less than 100° C. the products obtained to an oxidizing agent, for example the oxygen of the air, having no effect upon the alkali ferrocyanide but capable of oxidizing the sulphuretted hydrogen and the small quantity of alkali sulphide contained in solution as well as the precipitate of iron sulphides; in separating the soluble and insoluble compounds resulting from this oxidation; in treating the solution with ferrous sulphate in such a way as to obtain ferrous ferrocyanide; and in oxidizing the latter to obtain the fine prussian blue of commerce.

2.—A method of carrying out the process according to Claim 1, in which—

(*a*) the coal gas is preliminarily deprived of its ammonia;
(*b*) the alkaline ferrous solution contains no alkali hydrates, and is as free as possible from ferric salts;
(*c*) entrances of air into the apparatus producing the coal gas and the pipes for the passage of the gas are avoided;
(*d*) the fixation of cyanogen from the gas and the oxidation of the sulphur compounds are effected at a temperature lower than 100° C.

3.—The recovery, as bye-products, of ferric sulphate, which can be utilized for the oxidation of the ferrous ferrocyanide into the state of prussian blue, and of sulphur in powder.

4.—Fine prussian blue when obtained according to the process of Claim 1 or 2.

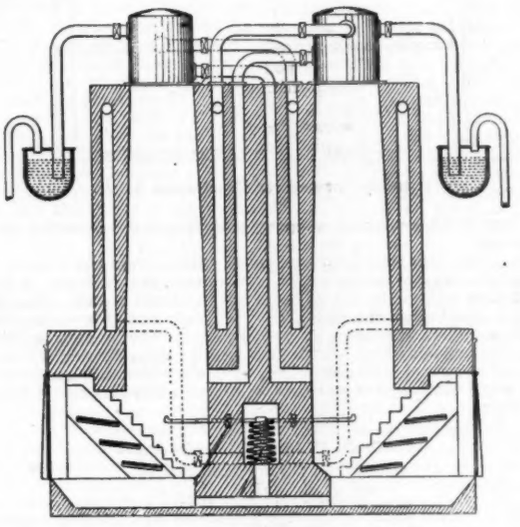
Gas-Generating Plant.—No. 191,255.

DUFF, J. R., of Banbury.

No. 32,906; Dec. 8, 1921.

This invention relates to gas-generating plant, and has for its object to provide an economical self-contained installation suitable for small gas-works and serving for the production of straight coal gas, producer gas, blue water gas, carburetted water gas, or mixtures of the gases, as may be desired.

The plant embodies two retorts adapted for alternative operation; the retorts being surrounded by, and in connection with, annular chambers, and also interconnected by valve-controlled shafts. The arrangement is clearly shown in the accompanying part-sectional side elevation.



Duff's Twin Retort Plant for Small Works.

In the normal working of the plant, one retort is filled with coke and generates producer gas which serves to heat the other retort containing fuel for the generation of straight coal gas. On the completion of the carbonization of the fuel, the residual coke remaining in the latter retort is employed for the generation of the producer gas, which is utilized to heat the other retort now re-charged with fuel. As each of the retorts may be made to function as a producer, they are fitted with step grates or other readily removable grates to permit the coke to be drawn when necessary. If desired, each retort may be worked as an independent producer-gas or water-gas generator. For such working the valves controlling the passage of the gases to the annular chambers or to the interconnection shafts are closed, and the retorts filled with hot coke, which is treated in the usual manner; the evolved gas passing to and through the hydraulic seal.

Gas-Heated Boilers.—No. 191,946.

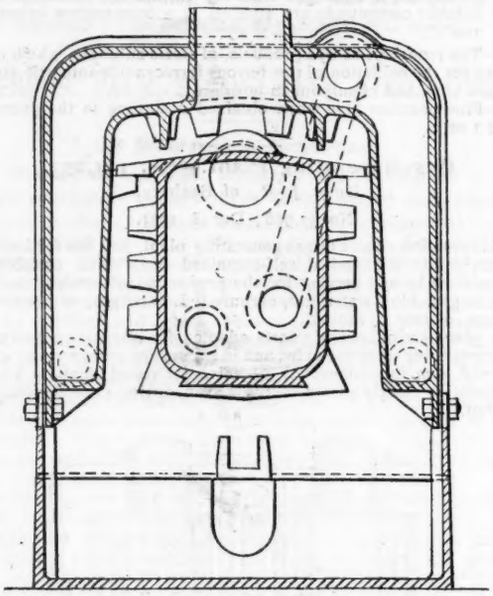
POTTERTON, T., of Balham, S.W.

No. 35,063; Dec. 30, 1921.

This invention relates to gas-heated boilers of the kind in which an inner section is embraced between the limbs of an outer saddle-shaped section completely separated from the inner section by hot gas passages leading upwards from the burners round the sides of the inner section and delivering to a horizontal flue extending from front to rear of the boiler along the top of the inner section.

It is claimed that in the construction which constitutes the present invention an increased efficiency is obtained by a particular arrangement of flues and baffles, which is designed to ensure the uniform distribution of the hot gases with respect to the heat absorbing walls of the boiler sections throughout the passage of the gases from the burner to the uptake. This result is attained by combining the arrangement of hot gas passages embracing the inner section of the boiler and coterminous with the horizontal flue extending along the top of that section with the provision of an uptake for the waste gases leading from the centre of the horizontal flue up through the top of the outer section of the boiler. Such combination is an essential feature of the invention and, in conjunction with an arrangement of staggered and mutually inclined baffles in the flues, ensures a uniform distribution of the hot gases over the heat absorbing walls of the boiler sections,

since the gases are prevented by these constructional features from following a line of flow which would favour one part of the boiler at the expense of another. As a further preventive of any such unsymmetrical flow, the horizontal flue is provided with longitudinal baffles extending some distance each way beyond the waste-gas uptake on both sides of the flue, to prevent the concentration of the gases in the direct lines of flue to the uptake. This results in their uniform distribution over the top of the inner section of the boiler as well as over its side walls.



Potterton's Improved Gas-Heated Boiler.

A transverse section of a boiler according to the invention is reproduced.

The usual heat absorbing lugs, which project from the walls of the boiler sections into the path of the hot gases, are arranged in staggered rows with the lugs in adjacent rows inclined to each other, thus equally distributing the gases, and to some extent arresting their progress and so increasing the efficiency. The underside of the inner section is provided with ledges or ribs extending from front to rear and so spaced as to collect any moisture which may condense on the surface of the boiler and prevent it from dropping on the burner or burners.

Gas-Stoves.—No. 191,931.

BRETT, C. G., of Tooting, S.W.

No. 33,651; Dec. 14, 1921.

This invention seeks to improve gas-stoves by obtaining a greater proportion of radiant heat from them and by preventing lighting-back.

It combines radiants made of suitable refractory material in the form of hollow chimneys of flattened section with open or lattice structure in the front, perforated with small holes at the back and top for the passage of the combustion products, and pips on the back inner surface of the radiants projecting into the flame; mixed air and gas being supplied to each of the radiants through a number of small holes for combustion within the radiants.

The invention also includes in combination a number of upwardly projecting spigots, one for each radiant, loosely fitting inside the bottom ends of the radiants, each spigot having a number of small holes for the exit of the mixed gas and air.

Gas-Meter Reversal Checks.—No. 192,026.

DANAHER, J. W., of Toronto.

No. 21,024; Aug. 1, 1922.

This invention relates to devices for preventing the reversal of the direction of operation of the meter mechanism by the expedient of reversing the inlet and outlet connections. A worm is secured to the spindle of the tangent arm and is adapted to engage and actuate one arm of a bell-crank lever, the other end of which normally lies out of the path of the tangent arm and is normally passed by it. A reversal of the direction of motion of the tangent arm causes the worm to engage the lever and rock it to draw its free end into the path of the tangent arm; but, the worm being of small pitch, this does not take place until the tangent arm has made at least one complete revolution.

Gas-Meters.—No. 191,962.

METERS, LTD., of Manchester, GLOVER, W. T., and BERRY, J., both of Oldham.

No. 2121; Jan. 24, 1922.

This invention relates to wet gas-meters, and has for its object to provide an improved arrangement of measuring or paddle device which shall operate with a minimum pressure difference between the gas inlet and outlet, and be capable of measuring efficiently both slow and rapid gas flows.

Two measuring drums are provided on the one shaft, having vanes or fan blades of opposite hand on their adjacent faces. The outer faces of the drums are dished, and into them project gas delivery pipes of the usual elbow and dip-pipe type leading to the meter inlet or outlet; the lower ends of the pipes being sealed by water in the waste box. Preferably the drums rotate in a part of the meter casing which is exposed to the inlet gas pressure; the area of the meter exposed to the delivery pressure, and which is between the backs of the paddles and the dished parts of the drums, being relatively small, so that but small fluctuations of water level occur during the working of the meter—ensuring accuracy of measurement.

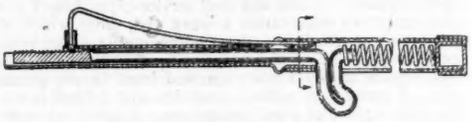
By the employment of two independent drums the end pressure exerted by the gas is balanced, and frictional losses in the measuring device are reduced.

Gas-Lighters.—No. 192,177.

NYBORG, T. G., of Sheffield.

No. 28,873; Oct. 31, 1921.

This invention relates to gas-lighters of the type wherein a spark is produced by the movement of a piece of tungsten steel or flint against a prepared pyrophoric or serrated surface. The object is to provide



The Nyborg Lighter.

an improved construction of device in which the spark is projected in the direction in which the apparatus is pointing. The construction and action will be readily understood from the accompanying sectional elevation of a lighting rod; the flint being held against the serrated portion by the curved spring wire, which has only to be lifted out of place in order to fit a new tip. The butt of the rod is formed as a recess for spare tips.

Liquid-Fuel Burner for Incandescent Mantles. No. 192,267.

CLEARY, E., of Adelphi, W.C. 2.

No. 229; Jan. 4, 1922.

This invention relates to a form of burner for liquid fuel (as described in No. 161,723), and is designed to enable such burner to be used for heating inverted incandescent mantles.

Burners for liquid fuel are known wherein the injector nipple is arranged at the end of a wire gauze-filled tube through which there extends axially the stem of a needle for cleaning the thoroughfare of the nipple. According to this invention, the burner comprises a heat-conducting plate that is heated at its underside by the burner proper and has extending from its underside a vertical gauze-filled tube, to the lower end of which the liquid fuel is admitted, and through which extends the stem of a combined pricker and valve that controls the delivery of the fuel vapour from the upper end of the gauze-filled tube to the nipple from which a jet of vapour passes into the injector tube; the latter being arranged on the upper side of the heat-conducting plate.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 21.]

Nos. 4060 to 4717.

BLAKEBOROUGH, J. E.—"Means for connecting branch pipes to mains." No. 4664.

BROADHEAD, J. B.—See Blakeborough, J. E. No. 4664.

CRAIG, G.—"Method of removing solid constituents from hot gases." No. 4572.

GIBSON, T. S. F.—"Apparatus for screening and grading coke, coal, &c" No. 4162

HANVEY, A. G.—"Gas, &c., heating devices." No 4526.

LINDSAY, A. K.—"Safety cut-off valve for distribution of fluids." No. 4170.

LUCAS, E. E.—"Combustion means for gas-furnaces." No. 4109.

MACKENZIE, M.—"Fractionating, distilling, or scrubbing column." No. 4544.

MACNAMARA, C. M.—See Lindsay, A. K. No. 4170.

MITCHELL, G. P.—"Gas heaters for curling-irons, &c." No. 4268.

NEATH, J.—"Manufacture of coal gas." No. 4235.

NEWELL, O. A.—"Pressure-regulating valves." No. 4234.

OUTWIN, E.—See Mackenzie, M. No. 4544.

PARKER, E. ST. A. W.—"Distillation of coal and utilization of coke breeze." No. 4659.

ROCHELLE, W. A.—See Newell, O. A. No. 4234.

SHANNON, J.—"Gas-stoves." No. 4611.

SHAW, A. G.—"Automatic attachment for dry gas-meters." No. 4085.

SOUTH METROPOLITAN GAS COMPANY.—See Gibson, T. S. F. No. 4162.

SYLVESTER, J.—See Mackenzie, M. No. 4544.

WEST, J. H.—"Manufacture of ammonium compounds." No. 4619

WHITEHOUSE, G. H.—"Gas-governors." No. 4382.

WOOD, T.—See Blakeborough, J. E. No. 4664.

Sentinel Gas Control Company.—With a capital of £5000, a Company bearing this title has been registered, to manufacture automatic gas-controllers, gas-radiators, &c. The registered address is No. 21, Mawdsley Street, Bolton.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

The following Bills were presented, read the first time, and referred to the Examiners: Oakham Gas and Electricity, South Oxfordshire Water and Gas, South Staffordshire Mond Gas, Swanage Gas and Electricity.

Bills presented and read the first time: Macclesfield Corporation, Plymouth Corporation, South Elmsall and District Gas. These Bills are now on the list for second reading.

HOUSE OF COMMONS.

Progress of Bills.

The Hoylake and West Kirby Gas and Water Bill: Read a second time, and referred to the Examiners.

Birkenhead Corporation Bill: Read a second time and committed.

The Barnsley Corporation, Chesterfield Corporation, Rawmarsh Urban District Council, and Torquay Corporation Bills are down for second reading.

Petitions Against Bills.

Petitions have been presented against the Oakham Gas and Electricity Bill, Macclesfield Corporation Bill, Plymouth Corporation Bill, South Elmsall and District Gas Bill, South Staffordshire Mond Gas Bill, and Swanage Gas and Electricity Bill.

Gas Regulation Act.

A copy was presented of the Gas Fund Accounts for the years ended March 31, 1921 and 1922.

On Wednesday of last week, Lord Somerleyton, in the House of Lords, moved that the draft Special Orders proposed to be made by the Board of Trade, under section 10 of the Act, on the application of the Harwich Gas and Coke Company and the Borough of Middleton, be approved; and this was agreed to. A similar motion, in regard to Middleton, was made by Viscount Wolmer in the House of Commons and passed.

Public Utility Companies (Capital Issues) Act, 1920.

Copies were presented of reports by the Board of Trade under the Act on applications by the Otley Gas Company, and the Crowborough District Gas Company.

Subsidences.

In the House, on Monday of last week, several questions were put to the Secretary of Mines in regard to damage caused by subsidence in various coal mining areas. Among other things mentioned was that the continual excavation of mineral had seriously injured gas mains in the Abertillery district. Lieut.-Colonel Lane-Fox, in his reply, stated that the Government hoped shortly to introduce a Bill relating to the working of minerals which would contain provisions under which a right of support of works and buildings may be compulsorily acquired in certain circumstances where the public interest demanded it.

Sulphate of Ammonia.

Mr. Hardie asked the Minister of Agriculture whether the price of sulphate of ammonia was regulated by the quantity in the market or by the operations of a combine controlling the trade.

Sir R. Sanders stated he understood that the majority of the producers of sulphate of ammonia agreed as to the price to be charged; but this price was naturally dependent on the supply and demand, and was materially affected by the price of other fertilizers.

Gas Charges.

Viscount Wolmer, replying to Mr. Clarry, who asked when the report of the Departmental Committee appointed to inquire as to the method of charging for gas on a thermal basis would be available to members, said it was hoped to receive the report shortly, and that it would be laid upon the table as soon as practicable.

Carbon Monoxide.

On the motion for the adjournment of the House last Wednesday, Mr. Harris again raised the question of water gas. He said there was a real need for further inquiry into the supply of gas. He reminded the House that up to about 1898 gas undertakings disposed of their coke for fuel purposes, but since then it had been more profitable to them to extract the bye-products of coal and coke; and in consequence they produced a large quantity of blue water gas, which contained about 42 p.ct. of carbon monoxide. He instanced the fact that the South Metropolitan Gas Company did not follow that practice. They continued to sell coke for firing purposes, and did not extract the bye-products, nor manufacture water gas. He next referred to the inquiry in 1898 by a Water Gas Committee, who recommended that there should be a Central Department to limit the proportion of carbon monoxide. No action, however, was taken by Parliament. The only course that had been followed was by the Local Government Board, and since by the Ministry of Health, who made it a condition to local authorities when applying for loans that they should limit the percentage of carbon monoxide in gas. Mr. Harris further suggested that there was machinery in existence by which the problem could be dealt with, and by which it could be decided whether or not it was advisable to impose any limitation. He considered it was a subject for an inquiry by impartial experts, not entirely guided by gas engineers. After referring to the recent gas leakage conference, Mr. Harris concluded by asking the Government to appoint a committee, so that the whole subject might be revised in the light of their experience and with the advantage of more expert knowledge.

The President of the Board of Trade (Sir Philip Lloyd-Greame), who replied, reminded the House of the Committee presided over by Sir William Pearce, which included two distinguished scientists. The Committee, after carefully going into the whole matter and hearing all the evidence, recommended that—

> The danger of an increased death rate is, in any case, of small dimensions, and against this must be set the certain improvement in the public health by the reduction of smoke and fog arising from the increased use of gas.

The Government were closely watching the matter. The Board of Trade and the Ministry of Health had collected all the information they could about every accident in which death had been certified to be due to gas poisoning. Mr. Butterfield, the well-known chemist and Gas Referee, was making a very careful analysis of all these cases, and when he had got his report he would lay it on the table as a Parliamentary Paper, so that the expert point of view might be known. He did not wish to prejudge the matter; and while he would not say that it might not be desirable to set up again the expert Committee, he would prefer to wait until he had received and considered Mr. Butterfield's report. Whatever might be their view when they got the full details and statistics for 1922, he hoped provisions might be made, both with regard to making arrangements that the mains would be carefully inspected whenever a road was taken up, and notification given to the public of the necessity of communicating with the gas company as soon as there was an escape of gas.

Disputed Gas Areas in Lanarkshire.

At the monthly meeting of the District Committee of the Middle Ward of Lanarkshire—Mr. W. Templeton presiding—a minute of the Gas Committee was submitted which showed that the Coatbridge Gas Company had written stating that, under their Act of 1877, they possessed powers to supply gas in the parishes of Old and New Monkland, Cadder, and Bothwell, and that they were advised that the County Council, by section 2 of the Burghs Gas Supply (Scotland) Act, 1876, were excluded; and in supplying gas to Bellshill and Holytown the Middle Ward District Committee were acting *ultra vires*. The Clerk (Mr. W. E. Whyte) said that, after having carefully considered the whole matter, he was of opinion that the Coatbridge Gas Company could not support their claim. The Company's Act, he said, prescribes limits of supply by section 4 as follows: "The limits of this Act shall be the town of Coatbridge and the suburbs thereof, and places within the parishes of Old Monkland, Cadder, New Monkland, and Bothwell, all in the county of Lanark." Both the Holytown and the Bellshill Gas Companies were in existence prior to the passing of the Coatbridge Company's Act; and, so far as can be ascertained, no suggestion was ever made at any time by the Coatbridge Company that they had rights of supply within the areas served by those Companies. The Coatbridge Company have never laid pipes or supplied gas within any part of the areas supplied by the Holytown and Bellshill Companies, nor have they any pipes within the gas supply districts of Holytown and Bellshill. The Bothwell and Uddingston Company obtained statutory powers in 1902 to supply gas in a defined area in the parish of Bothwell; and while the Hamilton Council (who claimed rights of supply in Bothwell Parish) were excluded by the Order from the Uddingston Company's supply, no reference was made to the Coatbridge Gas Company. The Coatbridge Company make no reference in their letter to the county authorities having acquired the Uddingston gas undertaking, nor to their operating the Burghs Gas Act in the Uddingston area. No indication was given by the Coatbridge Gas Company that they claimed any right of supply in the Holytown or Bellshill districts when the statutory procedure was gone through for the adoption of the Burghs Gas Supply Act. The meeting unanimously concurred in the Clerk's view, and resolved to repudiate the Company's contention.

Manchester Gas Matters.—The Manchester City Council decided at their last meeting, on the recommendation of the Gas Committee, to reduce the charge for gas by 6d. per 1000 c.ft.; and they also agreed unanimously to the Committee's proposal to erect a new gas-works at Partington, on the Ship Canal, at an estimated cost of £900,000. Sir William Kay said he was sanguine that gas could be put into the holders at Partington for nothing. In other words, the result might be that the residuals would pay for the coal and the labour. Alderman Jones regretted that the whole of the rating value of the new works would be reaped by an outside authority, and recommended that the next step should be the inclusion of Partington in the Manchester area.

Eastbourne Gas Company.—The Directors, in their report for the half year ended Dec. 31, state that the revenue account shows a profit of £11,548. There is a balance of £25,333 at the credit of profit and loss account, after payment of the half-yearly dividend in August last and other charges; and the Directors recommend the payment of the following dividends for the six months: At the rate of £7 15s. p.ct. per annum upon the "A" stock, £6 5s. on the "B" stock, and £5 upon the preference stock. These dividends will absorb £8785, and after other payments leave a balance of £16,548 to carry forward. Since the accounts were completed, the Directors have notified to the consumers a further reduction of 0·6d. per therm as from the end of the present quarter. This is the fourth since January in last year. These reductions represent a total saving to the consumers of rather more than 15d. per 1000 c.ft.

Hastings Price Reduction Notified.—Mainly owing to the increased sale of gas, but also by reason of certain economies, the Directors of the Hastings and St. Leonards Gas Company have been enabled to notify a reduction in price to ordinary consumers, as from the Christmas readings of the meters, of ½d. per therm—*i.e.*, 2·3d. per 1000 c.ft. The current price is 1s. 0½d. per therm, which is equal to 4s. 9½d. per 1000 c.ft. The corresponding price to prepayment consumers approximates to 14 c.ft. or (Mr. C. F. Botley, the Engineer and General Manager, points out) 6618 heat units, for 1d. This is the third reduction made since 1921, or an aggregate of 1s. 5½d. per 1000 c.ft. (3·8d. per therm). The new price shows an increase of 66·6 p.ct. over pre-war; and in comparison consumers are asked to note the following: Coal is still over 75 p.ct. more expensive than in 1914 (and may be dearer), and labour is double.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for an Order under the Gas Regulation Act.

DECLARATIONS OF CALORIFIC POWER.

Hayling Island Gas Light Company, Ltd.—500 B.Th.U. (April 1.)
Shelley and Shepley Gas Light Company, Ltd. — 500 B.T.H. (April 1.)
Shirebrook and District Gas Company.—500 B.Th.U. (April 1.)

GAS LEAKAGE CONFERENCE.

The Conclusions Arrived At.

In the "JOURNAL" for the 14th inst. (p. 381), reference was made to a conference on the above subject held at the Offices of the Board of Trade on Feb. 8. The conclusions arrived at by the conference have been printed in the Parliamentary Debates in connection with questions asked in the House; and we reproduce them from that source.

The conference is of opinion that the subjects which have been under consideration, namely,

(1) The best means of ensuring that gas-mains shall be inspected and defects made good whenever the street in which the mains are laid is opened in close proximity to the mains.

(2) The steps to be taken to impress upon the public that all escapes of gas of uncertain origin should be immediately reported to the gas undertaking of the district, and to acquaint the public with the best means of making such reports promptly.

(3) The question of the inspection of gas-fittings and the discouragement of the use of dangerous types of apparatus or apparatus fixed in a dangerous manner;

should be considered by the bodies represented at the conference.

Further, it is recommended that in the course of this consideration special attention should be given to the following suggestions, which have been adopted by the conference:

(1) That, in the interests of the public and of the undertakers, there should be as complete co-operation as possible between the highway authorities and the undertakers (including all bodies or persons having power to break up or open highways), and between undertakers themselves. With this object, procedure on the following lines is suggested for consideration:

(*a*) The highway authority should, as far as is practicable, before breaking up or opening any highway for renewal or reconstruction, give reasonable notice to all undertakers affected.

(*b*) The undertakers should forthwith, upon receipt of such notice, notify the highway authority of the position of their works in the portion of the highway to be broken up or opened, and whether or not they propose to execute any work in relation thereto.

(*c*) The highway authority should summarize the replies and send a copy of the summary to each of the undertakers.

(*d*) Any undertakers who propose to break up or open any highway should, in addition to notifying the highway authority, also notify the other undertakers concerned.

(*e*) The undertakers should, when highways are broken up or opened, take reasonable steps and be given reasonable facilities to ascertain, as far as possible, the condition of their respective works, with a view to executing such renewals and repairs as may appear to be necessary or expedient.

(*f*) In cases of emergency, where it is not practicable to give previous notice, notice should be given as soon as practicable after the beginning of the work or the necessity for the same shall have arisen.

(*g*) Periodical conferences should be convened between the highway authority and the undertakers to discuss difficulties and arrange procedure.

(2) That we are of opinion that gas undertakers should consider what additional means they can adopt to bring effectively to the notice of consumers the danger arising from escapes of gas and the necessity of reporting at once the existence of leaks; and we suggest that this might be done by printed notices in red on the face of the gas account, and affixed to the consumer's meter.

Further, we suggest that wherever practicable arrangements should be made by which notifications of leaks may be made immediately to the police or the nearest fire brigade station, and thence passed on at once to the gas undertakers, and that local authorities should be asked to instruct their employees to report immediately any indications of escapes of gas that come to their notice.

(3) That it should be taken into consideration whether gas undertakers should be given powers that would enable them—

(*a*) To prescribe the size and material of pipes for internal installation work on the lines of section 33 of the Gas Light and Coke Company's Order, 1922.

(*b*) To inspect the piping and gas-consuming appliances and the fixing thereof in any consumer's premises, and to refuse to give or continue to give a supply of gas to such premises if such piping, appliances, or fixing be found dangerous and the consumer refuses or neglects, after notice, to make the necessary alterations.

The Dundee Gas Committee have agreed to pay £1000 compensation in respect of Alexander Costello, who died as the result of an accident, falling through a hatchway while employed in the gas-works.

SMOKE ABATEMENT AND THE GAS INDUSTRY.

Lecturing to the Bradford Rotary Club, on Feb. 16 (as the guest of the Bradford correspondent of the "JOURNAL"), on "Smoky Bradford: Its Cause and Cure," Mr. R. J. Steele, B.Sc., M.B.E., President of the Bradford Scientific Association, and an industrial chemist under the Bradford Dyers' Association, Ltd., said he hoped for the time when the use of the open coal-fire would be prohibited by law. He urged factory owners and householders to use gas, electricity, or the coke products of low-temperature carbonization—particularly for heating and industrial power. It was curious, he said, that while millions of money were spent on attaining a pure water supply and a pure food supply for the people of this country, so very little, comparatively, was done to ensure a pure supply of the two greatest essentials to human life and all that it depended upon—sunlight and air.

Mr. Steele said he was not there to push business on behalf of the Bradford Gas Department. At the same time there was no question that if society ordered a stoppage of smoke production, the people would immediately turn to gas-fires, gas-cookers and other gas-appliances, and the people would be wise in so doing now before compulsion. The gas-fire provided smokeless heat and helped ventilation. For industrial purposes the gas-engine was a far more efficient producer of energy and power than any form of steam-engine. Electrical heating was also smokeless, but it was expensive; and until the current could be bought at a cheaper rate it was certain that electricity could not have a very great effect in the effort to reduce the smoke evil.

Speaking of gas, Mr. Steele said it might be as well to make a passing reference to the foolish scare which a section of the Press was trying to raise in relation to carbon monoxide. The view of the scaremongers seemed to be that the gas suicides and other poisonings of which such a fuss was made in these newspapers—and which were an almost infinitesimal proportion of the death-rate—were all the result of the new system of charging by the therm. Carbon dioxide was poisonous if present in quantity sufficient to overwhelm all else. Carbon monoxide was still more poisonous; but it was not poisonous if used with the ordinary care which had to be exercised with most things in life.

Alderman Dr. D. Walker (Deputy-Chairman of the Bradford Health Committee), voicing the thanks of the meeting to Mr. Steele, said there was undoubtedly a relationship between the death-rate and the volume of smoke over a city. Public authorities were becoming steadily more concerned in this subject; but there was yet a long way to go.

WALKER AND WALLSEND GAS COMPANY.

The Annual Meeting of the Company was held in the Company's offices, Neptune Road, Wallsend, on Feb. 16.—Mr. CHARLES J. POTTER presiding.

The CHAIRMAN, in moving the report and balance-sheet, referred to the loss sustained by the death of the late Mr. Charles Swinburne, who had been a Director of the Company since 1912, and moved that a vote of sympathy be sent to the family. Proceeding, he said that Mr. William Cochran Carr had been appointed to fill the vacancy on the Board; and they all knew Mr. Carr would be able to render valuable assistance to the Company. Their dividend this year, continued the Chairman, was a great improvement upon last year; they were now paying 5¼ p.ct. As compared with last year, the shareholders were getting an extra return of £1260 among them, which he thought was very satisfactory in the prevailing circumstances. On the other hand, the consumers were gaining something like six times more in the reduced price of gas. Their object in these reductions was to try to increase the consumption of gas, and the only way to do this was to reduce their prices. They were bringing their charge down this year to 10d. per therm, as against 1s. for nine months of last year, and 11d. per therm for the last quarter. They hoped these reductions would tempt the consumers to use more gas. The greatest part of last year's reduction in consumption was in the automatic penny-in-the-slot consumers. Of course there had been bad trade during the year, but they thought that the future would show improvement. Personally he was inclined to think that gas was a very sound investment. Electricity was not doing them any harm at present; and they had come to the conclusion that there was room for both in that district.

The VICE-CHAIRMAN (Mr. Andrew Laing) seconded the adoption of the report and balance-sheet, which was unanimously carried.

It was confirmed that dividends be declared as follows: On the preference stock at the rate of £2 10s. p.ct., less income-tax, making with the interim dividend £5 p.ct. per annum less income-tax; on the 3½ p.ct. consolidated stock at the rate of £3 10s. p.ct., less income-tax, making with the interim dividend £5 5s. p.ct. per annum, less income-tax; and on the 5 p.ct. ordinary stock at the rate of £4 5s. p.ct., less income-tax, making £6 15s. p.ct. per annum, less income-tax.

Cheaper Gas at Accrington.—Reductions in gas charges were announced at the Accrington and District Gas Board's meeting on Thursday, Feb. 15. Alderman D. C. Dewhurst (the Chairman) said the General Manager had made inquiries from 20 authorities. Returns had been made from sixteen, only two of which advanced their charges to ordinary consumers during the war period at a less rate per cent. than Accrington. The average increase with the sixteen was 120 p.ct.; with Accrington 82·5 p.ct. The capital charges on gas were £30,000 a year. The Board would reduce gas all round by rates varying from 10d. to 1s. 1½d. per 1000 c.ft. Slot consumers would get a rebate of 2d. in the 1s. Reassurances as to the safety of gas were made by the Manager. Alderman Rawson remarked there had been a scare about the proportion of carbon monoxide in the gas now being produced. The Manager said there was no fundamental change in the gas at all. The chief complaint was that the gas "stank" too much; and so long as it had a smell there should be no trouble.

COMMERCIAL GAS COMPANY.

The Annual Ordinary Meeting was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. W. G. BRADSHAW, C.B.E., in the chair.

The SECRETARY (Mr. F. J. Bradfield) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

DEATH OF A DIRECTOR.

The CHAIRMAN, in moving that the report and accounts be received and adopted, said: Ladies and gentlemen,—I regret that I have to preface my remarks to you to-day with an announcement of the death of our esteemed colleague Mr. Roland Yorke Bevan, who passed away a few days ago in the South of France, whither he had gone for the benefit of his health. His death was altogether unexpected. Indeed, we were looking forward to having him with us to-day. Mr. Bevan became an Auditor of the Company in 1901, and a Director in 1905. He was a very regular attendant at our Board meetings. He took a great interest in the Company's affairs, and was always ready to do everything he could to promote its interests. He was a charming colleague, and a good man of business. I am sure you will join with us in recording our appreciation of the services which he rendered to the Company, our sense of the loss which we have sustained by reason of his death, and our heartfelt sympathy with his family.

REDUCTIONS IN THE PRICE OF GAS AND A RISE IN THE DIVIDEND.

The most important feature of the report and accounts which I have the honour of submitting to-day for your acceptance is the repeated and substantial reductions which were made in the year 1922 in the price of gas. The report chronicles no fewer than three reductions during the year, and also mentions a further reduction to take effect as from Jan. 1 this year. These reductions together aggregate a decrease in the price of 5⅞d. per therm, which is equivalent to 2s. 1½d. per 1000 c.ft., calculated at the rate of 4⅞ therms per 1000 c.ft. The price charged now is 9⅝d. per therm, equal to 3s. 9⅝d. per 1000 c.ft. This price is only 63 p.ct. above the pre-war price. It compares very favourably with the increases in the prices of other commodities of domestic use; and it is considerably below the increased cost of the principal materials purchased by the Company. For instance, coals f.o.b. per ton are 83 p.ct. above pre-war level; retorts, 236 p.ct.; firebricks, 158 p.ct.; tubes 105 p.ct.; and timber, 136 p.ct. over pre-war cost. Salaries and wages are 135 p.ct. more than in 1913. I am glad to say that these large reductions in the price of gas can be accompanied by a moderate (although not a corresponding) rise in the dividends which we recommend to you, which will make an average increase for the year 1922 of 6s. 8d. p.ct. on the 4 p.ct. stock and 8s. 4d. p.ct on the 3½ p.ct. stock over those paid in the year 1913.

THE ATTACKS ON THE GAS COMPANIES.

Before proceeding further to draw your attention to the salient features of the Company's history during the year 1922, I cannot avoid alluding to the extraordinary attacks upon gas companies, in which a section of the Press has been indulging. It is difficult to discover how these attacks started, or by whom they were fostered. Suffice it to say that gas companies have many jealous rivals, and newspapers have urgent need of exciting copy in the dull season. Moreover, most people use gas, and many are not averse to helping forward any agitation which may possibly result in their getting it somewhat cheaper. Whoever is responsible, it is most extraordinary that the only industry in which the consumer is adequately protected against extortion or profiteering—as consumers of gas are by means of the sliding-scale—should be the one to be attacked. Under the sliding-scale, gas companies cannot profiteer. They cannot add to the dividends of their shareholders without at the same time giving to their consumers five or six times as much in the shape of a diminution in the price of gas. In this Company, for every £1 of additional dividend to the shareholders, £5 has to go to the consumers. During the war, and right up to the year 1922, the shareholders suffered a most unjust decrease in their dividends; and even now we are not paying sufficient dividends to cause our stocks to stand at par in the market. It is quite clear, therefore, that the shareholders have not benefited at the cost of the consumers. I wish it were possible to get the people who write in newspapers so glibly, and through them the general public, to understand that Directors of gas companies, quite apart from any impulse of philanthropy, have the strongest imaginable inducement in the interest of their shareholders and their undertaking to supply the best possible gas at the lowest price and in the most efficient manner. In no other way can they maintain their business and add to the prosperity of their Company or the dividends of their shareholders.

THE RESULTS OF THE MINERS' STRIKE.

There cannot, however, be smoke unless these is also fire, or at least friction; and I believe that at the back of this agitation against the gas companies there was a measure of genuine complaint, which arose in the following manner. The coal miners' strike began on April 1, 1921, and lasted until June 30 in the same year. The strike cost the gas companies hundreds of thousands of pounds. In the case of this Company, the direct loss was over £60,000, and indirectly we must have suffered a loss of nearly double that amount. In many cases the companies had small reserves, by the expenditure of which it was possible to defer raising the price of gas, or to increase the price to a smaller extent than afterwards proved to be necessary. Then at the close of the year a rise in price sufficient to balance the revenue account and provide a small dividend could no longer be put off; and the result was increased bills in the first half of 1922, which provided the newspapers with a sufficient excuse for launching their agitation against the companies. It must also be borne in mind that the miners' strike materially increased the cost of coal, and many people in consequence availed themselves for cooking and heating of the comparatively cheaper gas. Some appear to have ignored the advantage they had thus obtained when the gas bill had to be paid. Let me make it clear that, although this Company supplies an industrial district where every penny in the price per 1000 c.ft. is of the utmost importance, the agitation did not lead to any abnormal number of complaints. Indeed, they were fewer than usual last year; and, as is often the case when complaints are made, the difficulty was found in many instances to arise from defects in the consumers' own fittings. That there was no over-charging is unmistakably proved by the fact that, although we sold almost exactly the same quantity and quality of gas in 1922 as in 1921, the receipts from the sales amounted to only £781,820 in 1922, as against £951,743 in 1921, or £169,923 less.

CUBIC FEET AND THERMS.

A ridiculous suggestion was made that the higher gas bills arose from the fact that gas is now sold by the therm—that is, by the quantity of heat, instead of by volume or number of cubic feet. A therm is a definite amount of heat, and cannot vary; but a given volume of gas may contain more or less heat units, so that it is obvious to the least intelligent that consumers charged by the therm cannot be made to pay for more heat than is actually consumed. The mystery—or, shall I say, mystification?—arises from the fact that no satisfactory meter of heat has as yet been invented, and therefore the consumer's meter must register his consumption in cubic feet, which has then by a calculation to be transformed into therms. There is some room here for a suspicious consumer, unmindful of the frequent and stringent tests to which gas is subjected by the public authorities, and perhaps not versed in arithmetical calculations, to fear that the gas company may gain some advantage over him in the process of transforming cubic feet into therms. We are therefore printing both the number of therms and the number of cubic feet on our gas bills, and the comparative prices, so that he who runs may read. And if he cannot perform the calculation himself, he may take it round the corner to his more erudite neighbour, and get it checked to his complete satisfaction. The Committee appointed by the Board of Trade to investigate the newspaper complaints invited anyone and everyone to give evidence before them, but very few of the public responded. The few who turned-up had little or nothing of value to urge against the continuance of the therm basis of charge, and appeared to find it difficult to substantiate their complaints.

SHIFTING THE ATTACKS.

Finding the therm agitation becoming stale and unprofitable, certain of the newspapers have lately transferred their attacks to an objection to the presence of carbon monoxide in gas. Their action in this respect has been most mischievous and misleading. The impression left on the minds of the public by their statements is that gas companies are increasing the poisonous properties of the gas, with enormous profit to themselves. No one is more able to repudiate the accuracy of the last statement than gas company shareholders; and with regard to the former, it has always been possible to asphyxiate oneself by inhaling gas, and it always will be. But gas has been in daily use for more than a hundred years, and carburetted water gas for at least a quarter-of-a-century. Gas at the present time is installed practically in every town house in the kingdom, and yet the percentage of accidents due to it is infinitesimal as compared with fatalities from coal-fires or railway or street accidents. The Governor of the Gas Light and Coke Company, in his speech to his shareholders last year, and again this year, pointed out that deaths caused by railway accidents average about 2½ per million of the population, deaths from street accidents in London 100 per million, while deaths from gas poisoning, many of which are deliberate suicides, number only about 2½ per million. He added that one day's fog in our large cities causes as many deaths as are due to gas in the whole country in twelve months. It must also be remembered that the use of gas does more than anything else to reduce the smoke nuisance, and so abolish fogs.

ODOURLESS GAS NEVER SUPPLIED.

Our Company has manufactured carburetted water gas for over twenty-five years; and it has played a big part in keeping-down the price of gas. I do not mean that it is always much cheaper to manufacture than straight coal-gas, because in some years the actual manufacture has proved to be more expensive. It assists, however, indirectly in many ways. It reduces the demand for coal, and so helps to reduce the market value of coal. It necessitates the consumption of large quantities of coke which otherwise would possibly be unsaleable; and in foggy weather it is invaluable, as a water-gas plant can produce gas in a few hours, whereas a set of coal-gas retorts require nearly a week to attain the necessary heat. No company in England has ever supplied odourless gas; the distinctive pungent smell of coal gas is always present. The highest percentage of water gas made by this Company in any one year was in 1912, when oil and coke were particularly cheap. The average percentage made in that year was 36. Last year it was 18·6 p.ct., so that it is clear, so far as this Company is concerned, that the carbon monoxide content was very much less in 1922 than it was in pre-war years.

REDUCED PRICE OF COAL.

In spite of these childish, but none the less disturbing, influences, the past year might well be described as the first normal year since 1914. There have been no big upheavals to which during, and since, the war we have become accustomed; and, if it were not for the war clouds which are hovering over Germany and Turkey, the prospect for the current year would be most encouraging. The main cause which has brought about the reduction in price has been the reduced price of coal. The cost per ton carbonized during 1921, in consequence of the miners' strike, reached the high figure of 48s. 6d. per ton. During 1922 it was 32s. 5d. per ton—a difference of 16s. 1d. per ton. All this must not be looked upon as a saving, as, unfortunately, a fall in the price of coal is usually accompanied by a fall in the price of residuals, and these in 1922 realized 6s. 3d. per ton less than in 1921. The actual decreased cost of net coals is 9s. 10d. per ton, and is equivalent on a consumption of 240,000 tons to £118,000. Although residuals did not realize such high

prices as in 1921, there was a distinct improvement during the last half of the year.

AN IMPROVED DEMAND FOR GAS.

There was a distinct improvement in the demand for gas in our district during 1922. In 1921 we sold 8 p.ct. less gas than in 1920. In 1922 we sold the same quantity as in 1920. A satisfactory feature of the improvement which took place in 1922 was that it occurred in the latter part of the year. The consumption for the

Quarter to March was 3·91 p.ct. less than in the corresponding quarter of the previous year.
In the ,, ,, June it was 3·16 p.ct. ,,
,, ,, ,, Sept. ,, 1·30 p.ct. more.
,, ,, ,, Xmas ,, 6·09 p.ct. ,,

For the full year it was practically the same. An analysis of the consumption of gas during 1921 and 1922 under different heads, such as gas-engines, trade, lighting, and prepayment meters, shows that it is due to the improved trade supplies that we are able to announce practically a level consumption compared with the year 1921.

WAGES AND SALARIES.

Periodical reductions in the war wages and salaries are taking place by agreement with the representatives of the workmen and staff. These reductions are based, of course, upon the fall in the cost of living. The total of the wages and salaries paid in 1921 was £437,801, and in 1922 £352,146, a saving of £85,655. The following figures are of importance, because they show the immense burden which the Company has had to bear, and still carries, on account of these extra wages and salaries:

		£	Equalling per 1000 C.Ft. d.	Increase. P.Ct.
In 1913	the cost for wages and salaries was .	141,986	10·01	—
1920	,,	445,033	27·25	172
1921	,,	437,801	29·26	192
1922	,,	352,146	23·54	135

THE DIVIDENDS.

The net revenue account will give, as usual, a summary of the year's financial results. The balance of profit for the year, after paying all expenses, but before deducting interest on debenture stock and temporary loans, amounted to £173,999, which is £57,014 more than in the previous year. The interest charge was £23,456, which is £9268 less than 1921. This leaves £150,543, and adding to it £24,929 undivided profit brought forward from the previous year, we have £175,472 available for the year's dividends. We paid dividends at the rate of £5 12s. p.ct. per annum on the 4 p.ct. stock, and £5 10s. p.ct. per annum on the 3½ p.ct. stock, for the first half of the year, which absorbed £57,771; and we now recommend a dividend at the rate of 6 p.ct. per annum on both stocks for the second half of the year, which will take £62,198, and leave a balance of £55,503 of undivided profit available for dividend in the current year. If you adopt our recommendations, these dividends will make an average for the year of £5 16s. and £5 15s. p.ct. on the old and new stocks respectively. We are not recommending the payment of the full dividends authorized by our Order under the Gas Regulation Act, 1920, nor, as I have already pointed out, is the rate sufficient to cause our stocks to stand in the market at their par value; for we believe it is right that, as proprietors, we should share with the customers of the Company the burden of the abnormal times in which we live. It is obviously the duty and the interest of every citizen to do all that lies within his power to foster the trade of the country; and it is only on this principle that the slight improvement which may now be discerned in many of the industries and manufactures of the country can be strengthened and maintained. Our greatest need as a nation in these times is to cheapen the cost of production and increase the volume of our manufactures, so that we may be able to regain the markets of the world, and thus acquire the credits abroad needed to purchase our imports of food and raw material, without which we cannot continue to exist. We cannot discharge the large annual sums of interest payable in respect of the American debt unless our exports are increased.

THE FUTURE.

One word with regard to the future. The report mentions that we have further reduced the price of gas as from Jan. 1. This step was taken before the commencement of the French occupation of the Ruhr. A result of their seizure of the German coalfields has been that German manufacturers and merchants have been driven to make considerable purchases of coal in England, and in consequence the price of coal has hardened. It may follow, therefore, that we shall have to pay more heavily than we anticipated for our coals, and our profits may be correspondingly reduced. I trust, however, that we may be able to recommend at least as good dividends for 1923 as for 1922. My confidence is based upon the fact that we have a skilled and devoted staff and a body of workmen loyal and true, and appreciative of the betterment in their position and prospects which the Company has been able to bring about. All these, staff and workmen alike, have shared to the full in the improved prosperity of the Company, and, recognizing this fact, I believe that every man will realize his personal responsibility to pull his full weight, and by careful economy and strenuous endeavour to promote the interests of the consumers and shareholders who are his partners in this undertaking. If this hope is materialized, I have little doubt that our record for 1923 will be satisfactory, as I feel sure the report for 1922 must be to you all.

The DEPUTY-CHAIRMAN (Mr. H. E. Jones) said he had great pleasure in seconding the resolution, which needed no words of his to commend it, after the extremely illuminating speech of the Chairman.

There being no comments made by proprietors, the motion was then put to the meeting, and carried unanimously.

DECLARATION OF DIVIDEND.

The CHAIRMAN then moved: "That, pursuant to the recommendation of the Board of Directors, a dividend be declared for the half year ended Dec. 31, 1922, at the rate of 6 p.ct. per annum, less income-tax, on both the 4 p.ct. stock and the 3½ p.ct. stock of the Company, payable on Feb. 23, and that warrants for the same be forwarded by post to the proprietors." He remarked that the proprietors had not been accustomed to have the same dividend on both classes of stock. The reason for it was that the 3½ p.ct. stock received increments of 3s. 4d., while the increments on the 4 p.ct. stock were 2s. 8d.

Sir FREDERICK GREEN, K.B.E., seconded the resolution, which was agreed to.

RE-ELECTIONS.

The DEPUTY-CHAIRMAN said he had rather a qualified pleasure in proposing the next resolution, but as he would read it to them it omitted the cause which tended to qualify his pleasure—the much regretted absence from their number of Mr. Roland Bevan, who for forty-five years had been one of his dearest personal friends. With that little disability, he had the greatest pleasure in proposing: "That the retiring Directors, Mr. W. G. Bradshaw, C.B.E., and the Rt. Hon. Lord Marshall, P.C., K.C.V.O., be, and they are hereby, re-elected Directors of the Company." They had heard from the Chairman that day, and they had heard before, such an able and clear résumé of the position of the Company and its prospects, that it would be pure folly for him to try and enhance Mr. Bradshaw's merits. The other retiring Director, Lord Marshall, was a distinguished gentleman whose position to-day in the City of London, financially and otherwise, was such as very few men had enjoyed.

Sir FREDERICK GREEN seconded the re-elections, which were unanimously adopted, and were acknowledged by the CHAIRMAN.

The retiring Auditor (Mr. G. W. Ilsley) was re-appointed, on the proposition of Mr. G. M. GILL, seconded by Mr. DICKSON.

Mr. ILSLEY, returning thanks, said it was twenty years since the proprietors first did him the honour of electing him to that position. He had not seen many changes in the Board during that time, and was sorry to learn of the loss they had just sustained.

A cordial vote of thanks was passed, on the motion of Mr. FRANK JONES, to the Chairman, Directors, and staff for their services during the past year.

The CHAIRMAN's acknowledgment terminated the proceedings.

BRENTFORD GAS COMPANY.

The Annual General Meeting was held last Wednesday at Caxton Hall, Westminster—Mr. R. J. NEVILLE NEVILLE presiding.

The SECRETARY (Mr. H. L. Mann) having read the notice convening the meeting, the report of the Directors and statement of accounts were taken as read.

A FAVOURABLE REPORT.

The CHAIRMAN, in moving the adoption of the report and accounts, said that, on the whole, he thought these were very favourable indeed. The past year had been one of considerable difficulties; but the corner had been turned at last, and he felt that the business and the finances of the Company had taken a direction which would enable a return in the near future to the prosperous position they occupied before the war came in and upset everything. The past year had been one in which there had not been any strike troubles or anything else unpleasant, either in the industry itself or among the miners, and, in consequence, there had been a gradual reduction of costs. The shareholders would see by the balance-sheet that, in spite of the fact that last year the total receipts were smaller than in the previous year, the Company were really in a better position.

THE AGITATIONS.

During the past year there had been in use the therm system of charging; and this had given trouble to the industry, because of the agitation which had been kept up among the public as to the new method adopted. Also with regard to the composition of the gas and the various dangers which people seemed to think were due to its use, the Company had naturally had great anxiety. He did not know whether anyone present remembered a picture in "Punch" of many years ago—reproduced by the Gas Light and Coke Company in connection with their Centenary celebration—dealing with the time when gas making was in its infancy. The picture described the apprehensions that were felt by the public at the time, and predicted that people were going to be blown up right and left, that they would be suffocated, and that there would be terrific mortality among householders who proved foolish enough to take gas into their homes. Doubtless the present public had never known, or had forgotten, that "Punch" was the source of it; but they were still being scared by the perils of gas, although it was no more dangerous than it was in the earlier days. As to these supposed perils, if people would persist on using defective fittings which leaked, or would insist on keeping obsolete apparatus, it was not the fault of the gas companies that accidents occurred. Nobody who had any interest in the industry wanted any misfortune to occur; but that was the great trouble to-day. If gas companies could in any way minimize the chances of leakage or prevent the use of defective fittings they would do so; and the Brentford Company would be glad if customers would draw attention to any supposed defects, as the Directors wanted their gas used with the greatest safety. Another agitation was with regard to the composition of the gas. It had been said that, owing to the new methods of production, gas was very much more poisonous than it was before. It was now alleged that carbon monoxide formed such an enormous proportion of domestic gas that people were now liable to be suffocated instantaneously; but this was ridiculous. There were many towns in America where nothing but water gas was supplied, and yet the number of accidents which occurred there was not larger than in

places where carbon monoxide was restricted. If gas was carefully used and the consumers' fittings were in good order, there would be no more danger in water gas than in straight coal gas; and it was wrong to think that gas was more dangerous than it used to be. The position of the Brentford Company to-day in regard to carbon monoxide was exactly the same as it was before the war. There had been no complaints about carbon monoxide in Brentford before the war; and there was no greater reason for anxiety to-day than before. It was true that nowadays people who wanted to commit suicide did not blow out their brains as in former times. On the contrary, they adopted a less painful method—they shut all the doors and windows, turned on the gas-tap, and put their heads in the gas-oven. But this epidemic of suicide had done the gas companies a great deal of harm; and the Press were continually advertising the scare that people were liable to be instantaneously suffocated by gas. The suggestion made was that the companies were sending out deleterious gas; but he hoped that this suggestion would be allayed, as it was due to ignorance that the agitation had been started and continued in the Press.

THE OUTLOOK FAVOURABLE.

Speaking again of the position generally, it was very satisfactory to see that the prices of things were coming down, and that the price of gas, in consequence, was being reduced. Up to the commencement of last year, the Brentford Company charged 14·6d. per therm. This was reduced to 13·6d. per therm, then to 13d., and now the price was 11d. Under the new system the quality was now assured in a way it had never been before, and there was no doubt that the general opinion was that the fairest method of charging was by the therm—consumers being able to make their comparison of charges with the same ease as when they were paying on the basis of cubic feet. In regard to the cost of coal, this was higher in the case of the Brentford Company than in the case of the London Companies. Of the total cost of coal, the coal itself represented about two-thirds, and transport the remaining one-third. The Company was badly situated in regard to transport compared with the London Companies, who had wharves to which sea-going steamers could bring coal. The Brentford Company, on the other hand, had to get their coal discharged from ship into barge, for which they had to pay about 2s. per ton, after which it had to be taken 25 miles to the works for carbonization, which of course involved heavy lighterage charges. He expressed the hope that, as the prices of materials further dropped, the Directors would be able to see their way to dealing with the price of gas in a manner favourable to the consumers. At present, it was much too early to say what could be done. The difference between the average price of gas in 1922 and to-day represented £150,000. It was therefore necessary to economize to this extent before they could consider anything connected with the lowering of the price; and an important reason which impelled them to be very careful was that the price of coal was hardening owing to the German demand, and had already risen. The Directors could be relied upon, however, to deal with the matter to the satisfaction of the consumers and of the shareholders as soon as a favourable opportunity arose.

DIVIDENDS—A CAUTIOUS POLICY.

There was one thing he would like to say, and that was that, under the sliding-scale as it operated during the war, the shareholders were very badly treated, because, through no fault of their own, the Company were precluded from paying a reasonable interest to them for their money. At one time the highest amount they were able to pay on the "B" stock was £2 12s. 6d. p.ct., and on the "A" stock 3 p.ct. Now, however, they were in a much better position, and were able to pay the reasonable dividend of £6 2s. 6d. on the "B" stock. Perhaps some of the shareholders might think that because the Company were entitled to pay, under the sliding-scale, a much bigger dividend than the £6 2s. 6d. p.ct. declared this year on the "B" consolidated stock, they were entitled to have it, and that it was the duty of the Directors to give the shareholders this higher dividend. Personally, he thought this would be a mistake; and he believed the shareholders themselves would see that it would be. In the first place, nothing could be worse for the industry, from the point of view of capital and from the point of view of raising capital, than to have large dividends one half year and small dividends the next half year. No shareholder would know what dividend he was entitled to receive, or what he was likely to obtain; and the result would be very deleterious to the raising of capital. Therefore the plan of the Directors was that they were not going to increase the dividend until they could see that such an increase was assured, and that they would not be likely to have to reduce it again. Nobody at present knew what there was in the future. Therefore the Directors were not going to raise dividends merely because they had the power to do so under the sliding-scale. They were going to pay reasonable dividends if they could earn them and see some hope of maintaining them, and so get a stable dividend rather than one which jerked up or down. Therefore the shareholders ought to recognize that, although the sliding-scale enabled larger dividends to be paid, it was not politic on the part of the Directors to pay more than they were paying; and if the dividends now being paid could be maintained, the shareholders ought to be very well satisfied with their investment.

THE LATE SECRETARY.

There was one matter he ought to mention, and that was that they had lost their Secretary during the year. Mr. Croxford had been a very valued servant, and those who had been connected with the Company for a series of years knew that it was a very honoured name on their staff. Mr. Croxford, he regretted to say, died suddenly in the middle of the year. In his place they had appointed Mr. Mann, who also possessed a name which was very much honoured in the Company.

A TRIBUTE TO MR. MILNE WATSON.

One other thing he would like to say was that Mr. Milne Watson, the Governor of the Gas Light and Coke Company, and one of the Directors of their Company, was unable to be present. Unfortunately, coming home from the Continent Mr. Watson caught a chill, and was in bed, but he wished him to express his regret to the shareholders at his inability to be present. Personally, he would like to say a word about Mr. Milne Watson, because not only did the Brentford Gas Company, but also the whole of the gas industry, owe a great debt of gratitude to the Governor of the Gas Light and Coke Company for the way in which he had led the industry during the past few years, and especially when the industry had been attacked, as it had been attacked, by the public, and for the way in which that attack had been countered. In addition, Mr. Watson had been Chairman of one of the great Committees who settled the wage question in the industry, and he had done enormously good service to the industry in arranging for the wages adjustment, which had been one of the greatest difficulties. During the war, wages rose to such an extent that the industry hardly knew where it stood; but now, without any dislocation in the way of strikes or anything of the sort, there had been remissions of wages which appeared in the accounts, and had helped very largely in getting the balance of profit shown there. As a matter of fact, the whole industry owed Mr. Watson a very great deal indeed for the skilful way in which he had managed these difficult wage questions, the difficult therm inquiry, and a large number of other questions with which he was always dealing; and they must all feel thankful for the manner in which they had been dealt with.

THE CALORIFIC STANDARD.

There was one other matter he ought to refer to, and that was the calorific standard. Their standard was 460 B.Th.U.; and there had been very satisfactory reports by the Gas Referees with regard to the maintenance of the standard. Some shareholders or consumers might think it would be advisable for the Company to have a different calorific standard. The Gas Light and Coke Company had a standard of 500 B.Th.U., the South Metropolitan Gas Company had one of 560 B.Th.U., and other companies had other standards. The Brentford Company chose 460 B.Th.U. because it seemed to be the gas which could be most economically used in their district. Districts varied as between each other to an enormous extent, and the Board came to the conclusion that a calorific value of 460 B.Th.U. was at the moment the best for the district, and it was proposed to continue to use it for the present. But if there was any good reason for thinking the district would be better served by having a different calorific value, the Board would consider an alteration. There was, however, one thing which should be emphasized, and that was that if they wanted to burn gas and get the best results out of it, proper appliances must be employed. It was no use a person saying he had a stove which was perhaps thirty years old, and expecting to burn this gas or that gas without considering whether the stove was really obsolete. The appliances which the Company sent out now were adapted to the gas being supplied; and if people complained, as they sometimes did, of the inefficiency of the gas, it might be that their appliances were obsolete, and they would get a much better efficiency if they were to go round to the showroom or write to the Company and ask for someone to be sent round to examine the fittings. Very often it would be found that if the consumer put in new appliances there would be a much greater efficiency than had previously been obtained. The Company were anxious that all their consumers should be satisfied; and if there was anything they could do to give this satisfaction, they wanted to do it. If the consumers had any complaints, they had only to say so, and someone would come round and try to put a different complexion on the matter, because the Company wished to satisfy their consumers and their shareholders, and so improve the business. That was all he had to say generally; but if there were any questions, he would be pleased to answer them.

He now begged to move:

> "That the Directors' report and statement of accounts as prepared for the year ended Dec. 31, 1922, be received and entered on the minutes."

Sir ROBERT SHAFTO ADAIR, Bart.: I beg to second that.

There were no questions from the shareholders, and the resolution proposed by the Chairman for the adoption of the report and statement of accounts was passed unanimously.

THE DIVIDEND.

The CHAIRMAN then moved the following resolution:

> "That the following dividends for the year ended Dec. 31, 1922, subject to income-tax, be declared: A dividend at the rate of £5 p.ct. per annum on the 5 p.ct. preference stock; at the rate of £6 2s. p.ct. per annum on the "A" consolidated stock; at the rate of £6 2s. 6d. p.ct. per annum on the "B" consolidated stock; and that such dividends be payable on the 1st day of March next."

Sir ROBERT SHAFTO ADAIR, Bart.: I beg to second that resolution. The resolution was carried unanimously.

RE-ELECTION OF DIRECTORS AND AUDITORS.

Sir ROBERT SHAFTO ADAIR, Bart., proposed: "That Mr. Reginald James Neville Neville, Brigadier-General Alexander Hugh Warlters Cowie, C.M.G., and Mr. Herbert Edward Griffith be and are hereby re-elected Directors of the Company." He need not say very much about Mr. Neville, who had been Chairman for ten years, and everyone looked forward year by year with great interest to his annual statement of the position of the Company, and they all knew that the position was very largely owing to the time and talent which Mr. Neville devoted to the affairs of the Company. Brigadier-General Cowie was one of their senior Directors and was always of great assistance to the Board with his advice, and Mr. Griffith had been connected with the Company for a long time, and was always a great help to his colleagues.

Mr. WILLIAM MANN seconded, and the motion was carried.

The CHAIRMAN, in thanking the meeting for re-electing him and his co-Directors, said that if there was anything they could do to ensure the prosperity of the Company with which they had been connected for so many years, they would be only too pleased to do it. He had been a Director for thirty years, and he remembered when their old friend, Mr. Ward, had been Chairman for he did not know how many years. If there were any who had the welfare and interests of the Company at heart, it was those whom the shareholders had been good enough to re-elect Directors.

Mr. FORRESTIER CLAYTON proposed the re-election of Mr. Monier F. Monier-Williams and Mr. Alfred Bevis as auditors for the ensuing year.

Mr. WILLIAM EDGAR seconded.

The motion was carried.

The CHAIRMAN then proposed that the best thanks of the shareholders be given to the Engineer, staff, and workmen for their services during the past year. No company, he said, could be better served than were the Brentford Gas Company in this respect. There had never been any trouble with them even during the war, and there had been nothing but the fullest co-operation and fullest possible assistance from everyone right through. He hoped the staff and workmen appreciated the shareholders as much as the shareholders appreciated them.

Mr. FARQUHAR seconded the vote of thanks.

Mr. A. A. JOHNSTON (the Engineer and General Manager), in acknowledging the vote of thanks, said he did so not for himself but for the staff and workmen through whose efforts such an excellent result as that shown in the balance-sheet had been secured. He could tell the shareholders that no gas company in the Metropolis, or, indeed, in the United Kingdom, had a better staff than that of the Brentford Company. They were criticized, he knew, and he appreciated that there was room for criticism. But where would they not find room for criticism? The staff did absolutely their best, both in the interests of the Company and in the interests of the consumer. Although the consumer did not always believe it, but it was certainly true. They tried to help the consumer in every possible way if they were only given the chance. It was very easy for people to criticize; but if they would not get in touch with the Company and say what was wrong, how was it possible to deal with them? The inspection of fittings had been carried out during the last few years, as soon as it was possible after the conclusion of the war; and they had done their very best. Still there were people who grumbled; but he could not help saying that if they had any cause for complaint, it was very largely their own fault in many cases. He thanked the shareholders on behalf of the staff for their vote of thanks, and would have very much pleasure in conveying it to the staff.

The meeting then closed.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Ordinary General Meeting of the Company was held on Tuesday of last week, at the Cannon Street Hotel, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. C. W. Braine, F.C.I.S.) read the notice convening the meeting; and the Directors' report and the statement of accounts for the year ended Dec. 31 were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he would not detain the proprietors longer than he could help; but he would try to give them a résumé of the position of the Company generally, as well as particularly, and then they could ask him for any additional information they might desire. The accounts submitted showed a decrease in the sale of gas of only 1·2 p.ct.; and he was glad to say that this corner had now been turned, and they were getting some increase. They must not be surprised to hear of decreases today, because people had no money to spare, and therefore had to be careful.

INCREASED DIVIDENDS.

The revenue account for the year, as the report told them, after providing for interest on the mortgages, debenture stock, &c., enabled the Board to propose, and they did so with a great deal of satisfaction, that an increase of dividend should be declared, the amounts of which were set forth in the report. He thought they would all agree that they were well and clearly shown there, together with the amounts of the stocks and the periods at which they were raised. These details formed an answer to any enemies who might say that the Company were paying too much dividend. Upon the very small amount of Wandsworth "A" stock, which represented practically the founders' share, and which totalled only £30,000, they paid 8¾ p.ct. per annum; and this was not too much. He was old enough to remember when people never thought of putting money into gas undertakings at less than 10 p.ct.

Mr. F. G. SAMSON: That is what it ought to be now.

The CHAIRMAN said he quite agreed, and he saw the electrical people were paying it. Then upon the much bigger amount of Wandsworth "B" stock, which was raised very largely before 1870, they were paying 7¼ p.ct. per annum; and on the £248,978 of capital belonging to the two classes known as "C" stock and new ordinary stock, which ranked together, they proposed to pay 6½ p.ct. per annum. On the lucky Wimbledon stock—the stock of those who came in as very good partners, who had contributed largely to the prosperity of the Company by bringing in a big sale of gas—they were paying 6⅞ p.ct. Upon the £93,000 of Epsom stock the rate was 7⅜ p.ct. Now they should just mark this fact. These dividends, together with those paid in September last, gave an average for the year of £6 3s. 10d. p ct., which was 3s. 11d. less than the average pre-war dividend. There was a great idea abroad that they were going out profiteering, and were going to pay bigger dividends than they did before the war. As he had shown, it was really rather less; and if they included the £88,000 appearing in the capital account as premiums paid by the proprietors when they bought their stock, it would be seen that this reduced the dividend return to an average of £5 13s. 6d. p.ct. There was not much to complain about in this on the part of the consumers. The Directors went on to recommend that the sum of £4549 be transferred to the reserve fund. This was a little amount which had been kept back from the proprietors that day, and which they might have had; but prudence told the Directors that they should not recommend its distribution, because, as they would learn when he came to speak on the accounts, there was a great deal of money to spend on repairs. All through the war they could get neither material nor men, and so the works had to wait for repairs, which were now being carried out. He expected that for the next year or two they would be spending money heavily on the upkeep of the undertaking.

PRICE OF GAS REDUCED.

The price of gas had been reduced by 4d. per therm—he much preferred to say 1s. 7d. per 1000 c.ft.—from Midsummer last. The Gas Referees had certified that the gas supplied by the Company was 479·7 B.Th.U. for one period, and 480·5 B.Th.U. for another, giving an average of something like 10 B.Th.U. above that which the Company declared and promised to supply. So that they had done their duty in this respect.

NEW CAPITAL.—NOT TO BE MISSED.

The requirements of the Company had laid upon the Directors the necessity of calling for new capital; and the proprietors would be invited to tender for it. If, in racing terms, he could give them a "tip," it would be: "Do not miss it." Certainly, he would not miss it himself. If they would turn to the balance-sheet, they would find that, in their hours of need, their bankers were good enough to lend them £400,000; and this Christmas the amount had been reduced to only £250,000. It was intended to raise just sufficient money to pay this off; and they would receive circulars setting forth all the particulars and all the prospects. They must not be allured by the prospects; but he could tell them they were very good.

BENEFITS OF PROFIT-SHARING.

There was one very satisfactory item in the accounts, and this was that at the end of the year they had managed to squeeze out a sum amounting to £7512 for the employees under the profit-sharing scheme. All through the war they could not give them anything in this way, because the price of gas was so exaggerated. It was as much as the Board could do to give the proprietors the miserable dividend they received, which got as low as £3 1s. 10d. p.ct.; this being the average for 1920. No one could call that extravagant. Now, however, the Company were in better circumstances, and the employees were enabled to benefit under the profit-sharing scheme, which was one of the wisest things in connection with the sliding-scale introduced by the late Sir George Livesey. They must never be deluded into the belief that the sliding-scale had broken-down. Not a bit of it. When the price of gas went down, the men came in under the profit-sharing scheme; but they had to help to get the price down before they received this benefit. The difference between their profit-sharing scheme and some others was that in this Company the men got their profits in the shape of shares in the undertaking, and not in money. If they compared a cheerful, active, well-impelled workman, who knew that he was working for himself, and therefore did his best, with a shiftless, idle man, who did as little as would qualify him to get his money at the end of the week, they would find that the difference was not a small percentage, but a very big one. If you can secure a man's heart as well as his muscle, that is the way to work well and pleasantly together. Again, they had benefited their staff and workmen by the establishment of a pension fund, which the proprietors approved of at the last meeting; and this stood at the present time at £9000. This was a beginning; it would soon become greater. It was a contributory scheme, and was largely managed by Mr. Frank H. Jones, with the other Director members of the Works Committee. He could tell them that this pension scheme was much appreciated by the men; and it gave the proprietors the happiness of knowing that the members of the staff and the workmen were secured from hardship and positive need in old age and infirmity, which must be gratifying to them.

CAPITAL OUTLAY.

The capital expenditure of the year, owing to the hardness of the times, which made any avoidable outlay very undesirable, amounted to £684, after allowing for depreciation. It had been incurred chiefly on housing, meters and stoves, and ships. They had improved their shipping service, and had restored a name dear to the history of the Company—that of the little ship "Wandle," which fought a German submarine. They had had a new boat built. The hardships of the war removed several of their ships, and they had had to buy small ones which were not so profitable to run. Now they had cleared away two of these, by the substitution of another vessel on the same lines as, but of rather bigger capacity than, the "Wandle." They were very proud to have such a boat in their service. Coming now to the question of capital, he might say that, in spite of economies, the capital had increased to 8s. 3d. per 1000 c.ft., or rather over £400 per million, whereas before the war it was 7s. 3d. per 1000 c.ft. This difference was nothing very alarming. It really meant that to carry the stores necessary for their business at double the former prices swallowed up this difference; and when prices returned to normal, they would get rid of this extra 1s. capital per 1000 c.ft., which he was sorry to see. There was nothing much more in the accounts for him to call attention to. Under present conditions, it was really impossible to compare one period with another. Coals had gone down enormously, and residuals had fallen correspondingly. They might, however, be surprised to see that the Company had spent £153,428 on works and plant, as compared with £132,930 in the previous year. This was a necessary and wise step to take. Unless plant, &c., was constantly replaced, it was impossible to get the most modern appliances, which enabled one to do the same work in a better way. On mains and service-pipes they had spent £67,850, on meters £30,167, on stoves £50,276, and on automatic fittings £13,000. But he was sorry to tell them that these sums did not represent the benefit the Company would have had if costs had been normal. It was necessary to halve these amounts to ascertain the real extent of the benefit. Because of this, it was very undesirable to spend capital or do repairs yet to the full extent. They were, however, getting on with the work, because if a

concern once got out of order, one could not tell what the profits were going to be. They had for the first time carried a sum to the special purposes fund, to meet the expense of removing some gasholders. The works had become so congested with the increase of business that it was not desirable to continue to store gas on the old sites. They must therefore remove the holders to positions which were not only cheaper in land cost, and so on, but were much more serviceable in the scheme of distribution. It was much better to store the gas away from the place at which it was manufactured, and in the district where it was going to be consumed. It was then ready when the big demand came along. There would be further appropriations to this special purposes fund, because it required a good deal of money to remove such things as these—particularly in these difficult times. He thought that he had now dealt with every subject that would be of interest to the proprietors; but if he had missed anything he would be very glad to answer questions. He would just like to say once again: "Do not miss the chance that is coming along of investing in this, which is certainly the lowest-priced gas company in the Metropolis—at any rate, of those working on a similar scale and making the same gas." He did not enter into competition with people making a great deal of cheap gas. All his, practically speaking, was coal-gas.

THE THERM CHARGE AGITATION.

There had been an agitation lately in connection with charging consumers for gas by the therm. Whether one called it sperms, as it used to be for candles, or therms, as it was to-day, to please the electricians or the chemists, it did not help matters. Anyway, it did not please him. The new method upset all his old standards as a gas engineer; and so it did the consumers, who did not understand it. However, when the recent inquiry was held, the Company were able to put in a form of account which satisfied the Chairman of the Committee, who had nothing to complain about as regarded them. They showed on the accounts that 9d. per therm—which last year was the lowest in London by a good deal—was equal to 3s. 6d. per 1000 c.ft. He thought it was a pity himself to puzzle the poor consumer about the therm. The consumer knew what the meter said; but the quality must be arrived at by the chemist. The meter told the consumers how many cubic feet of gas had been consumed, and he would prefer to go on telling them this.

CONSUMERS AND CARBON MONOXIDE.

Another question before the public was poisoning by gas. On the previous day, this had occupied the attention of Parliament; and it was being inquired into. Whether gas were to be good or bad, dear or cheap, it was a consumers' question. If their consumers asked the Company to give them a certain gas, they could do it, as they had all the necessary plant. If it cost more, the consumers would have to pay for it; while if it cost less, the consumers would gain. It was, however, their question, and not that of the Board.

The DEPUTY-CHAIRMAN (Mr. R. Garraway Rice) formally seconded the motion.

THE ATTACKS ON THE INDUSTRY.

Mr. A. M. PADDON said he wished to congratulate the Board on being able to sell gas at so low a price in Wandsworth. It was not, however, the lowest charge in London, as they had a humble little rival (the Hornsey Company) in the North of London. The accounts, as usual, were an example to emulate, and not to criticize. They reflected the great experience, skill, and devotion of the Chairman and his colleagues, and spoke for themselves. He would, however, like to say a few words about the industry generally, as affected by the last two points mentioned by the Chairman. Upon both of these matters they had been attacked by certain sections of the Press. He did not think the first object of attack—the therm—was happily chosen. Probably an inquiry in regard to the therm was the last thing the attackers desired; and he was sure when the report of the Committee was ready they would like it still less. The whole course of the inquiry demonstrated the utter fallacy that underlay the attack. Anyone would think, from the attack made on the industry, that it was the industry which initiated the therm, whereas it was the result of a technical investigation by experts, and it had been adopted by the Government independently of the industry as a proper standard—and so indeed it was. Many gas administrators would like it because it afforded a definite basis of comparison; but as to conferring any commercial advantage upon a gas undertaking, it had done nothing of the kind. It might in the long run be of some benefit to the consumer, because he would get what he paid for. Then with reference to the agitation developed on the subject of the poisonous qualities of gas, the answer to this lay in the smallest possible compass—there had been no change whatever in the composition of gas as distributed in the Metropolis and suburbs during the last 25 years, and there had been no practical change in the last 100 years. The slight change that did supervene a quarter-of-a-century ago, as had been demonstrated by every competent expert, had had no practical effect whatever. Of course, carbon monoxide was a deadly poison; and so was every other constituent of gas. If it was breathed for a sufficient length of time, it would have fatal results; and so would everything else except air. A man might be poisoned by any other constituent of gas; and in many cases the cause of death was not carbon monoxide, but other toxic constituents. Carbon monoxide, however, was the only one that left a trace. All that the Press had succeeded in conveying to the average consumer was that the wicked gas company had brought carbon monoxide into his house. But suppose all the gas companies had gone away, and all the mains had been taken up, then from every hearth, in every room, in every house, the consumer would still be producing carbon monoxide in absolute contact with living conditions. Anyone would think, from reading the Press, that the gas industry was responsible for bringing carbon monoxide into the life of the consumer. They must be guided by contemporary practice, and could not leave out of consideration what was done in America at the present day. In New York, a city of luxury, the gas consumption was going up and up, and nine-tenths of it was straight carburetted water gas. Why should they use it if it possessed any of the qualities attributed to it by the Press? They did all manner of things with electricity. Were they destitute of intelligence? Of course not. So far as they were concerned, this attack was nothing but a fly-blown back-number of a fallacy that had been dealt with long ago. Some of those present were old enough to remember what the condition of the air in the Metropolis was forty years ago; and the amelioration that had taken place in the matter of fogs was due to the use of gas for cooking and heating. Should they consider for one moment the absolutely negligible risks in connection with the development of an industry that meant so much for the whole community?

The CHAIRMAN thanked Mr. Paddon for his remarks, and repeated that it was really a consumers' question. He and his colleagues would be the last to suggest that the consumer should have anything he did not like. During the insane coal strike, they had to make gas from anything they could, and then carburetted water gas was a godsend. It formed a very effective means of cooking and of keeping people warm who would otherwise have perished from cold.

The resolution was then put and carried unanimously.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, dividends were declared at the rates explained by the former in his address, and it was agreed that the sum of £4549 9s. 5d. should be transferred to the reserve fund.

RE-ELECTIONS.

The CHAIRMAN then proposed the re-election of the retiring Directors, Messrs. W. G. Langlands, H. S. Freeman, and R. M. Chart. He said Mr. Langlands was a tower of strength to them, and represented the Epsom portion of the capital. He had been of the greatest assistance to the Board in any questions of valuation or land acquisition, especially at Epsom, which would one day be the centre of a large and populous district. Mr. Freeman was a very old colleague whose wise counsel and thorough knowledge of the industry were exceedingly helpful. Mr. Chart represented Mitcham, and did it very well.

The DEPUTY-CHAIRMAN seconded the proposition, which was agreed to.

The retiring Auditor (Mr. H. W. Smith) was re-appointed, on the motion of Mr. PORTER, seconded by Mr. SAMSON.

THANKS.

The CHAIRMAN said they would not wish to separate without making acknowledgment of the good work done by the whole of the staff of the Company. Mr. Braine and Mr. Croft represented a very willing and industrious, and zealous body of men. Mr. Croft, though young, had shown great ability. He had introduced and worked-up a method of carbonization suggested by a gas engineer now dead which he (the Chairman) thought would catch-up anything in existence to-day. Mr. Croft had done this very well. The system secured the object aimed at, and it was economical. Again, Mr. Croft's heart was in shipping, and it was very much on his advice that the Company had re-formed their fleet of steamers.

Mr. H. S. FREEMAN seconded the vote, which was heartily accorded.

Mr. BRAINE, returning thanks for the staff and the men under him, said some mention had been made of profit-sharing having been resumed. He could assure the proprietors that this was highly appreciated by all, and perhaps even more so was the pension fund which had been started. All those who were eligible for this fund had joined.

Mr. C. M. CROFT (the Chief Engineer) also returned thanks for himself and his staff. He declared that from the last boy taken on upwards, there was a feeling that the interest of the Company was their interest.

Mr. A. F. PHILLIPS asked all to join with him in passing a hearty vote of thanks to their excellent Chairman and Directors for having furnished them with such good results. They must congratulate the Board upon all that had taken place in the past year; but they had every confidence that it would be improved upon in the future.

Mr. PADDON seconded the vote, which found warm support among those present.

The CHAIRMAN, in reply, said he hoped that when next they met he would have to announce a further reduction in the price of gas, and that there would be another addition to the dividend in consequence.

Walsall Gas Price Reduced.—The Finance Committee of the Walsall Corporation state that, having carefully considered a report of the Borough Treasurer and of the Gas Engineer in regard to the probable financial results of the year ending March 31 next, they have reduced the price of gas to all classes of consumers by 4d. per 1000 c.ft. as from the last meter readings. The Committee are hoping that at an early date they will be able to make a further reduction.

Buckhaven and Leven Gas Supply.—The problem of securing an adequate and economical supply of gas has been considered by the Buckhaven and Leven Gas Commissioners, in connection with an exhaustive report by Mr. H. A. Aitken (the General Manager). After discussing three schemes, the Commission favoured the installation of vertical retorts, and concentration upon the site of the Leven Gas-Works, only the holders to be retained at their East Wemyss Gas-Works. The total cost of the scheme is put at £45,000; but, of course, large economies are anticipated from the new plant.

Wakefield Gaslight Company.—Alderman G. A. Moorhouse, J.P. (the Chairman), presided at the annual meeting of the Company on Feb. 19. In moving the adoption of the report, he referred to the satisfactory reduction in the cost of coal and other charges. The sale of gas was a record, and showed an increase of 3·08 p.ct. The selling price had been reduced since March 31 last from 12·6d. to 10d. per therm (or from 5s. 3d. to 4s. 2d. per 1000 c.ft.); and it was proposed further to reduce it to 9d. per therm from the reading of the meters for the March quarter. This will bring the price down to the equivalent of 3s. 9d. per 1000 c.ft., an increase of 50 p.ct. over the pre-war price. Final dividends of 4 p.ct. on the ordinary and 2½ p.ct. on the maximum—making 6½ p.ct. and 5 p.ct. respectively for the year—were approved. This was the pre-war dividend—paid for the first time since 1914. Votes of thanks were accorded to the Chairman and Directors and the Managing-Director (Mr. H. Townsend), the Secretary, and their respective staffs.

TOTTENHAM DISTRICT LIGHT, HEAT, AND POWER COMPANY.

The Annual Meeting of the Company was held on Tuesday of last week, at the Offices, No. 639, High Road, Tottenham—Mr. HENRY WOODALL in the chair.

The SECRETARY (Mr. E. J. K. Fussell) read the notice calling the meeting; and the Directors' report and the accounts were taken as read.

Mr. W. G. BROWN said that, on behalf of a number of proprietors, he wished to make a very strong protest against the meeting being called for that hour of the day (noon).

The CHAIRMAN replied that, at the request of several shareholders, it had been decided to alter the time of the meeting to the morning, because many of them found it difficult to get down to Tottenham in the afternoon. It was usual to hold company meetings in the morning; and the change was made to oblige shareholders. Judging by the excellent attendance, it had been a wise change to make. He thought it was the best meeting they had ever had.

Mr. RIDDELL said he wished to support the protest.

PERSONAL MATTERS.

The CHAIRMAN, proceeding to move the adoption of the report and accounts, said his first duty that day was a sad one—namely, to recall the loss the Board and the shareholders had suffered in the past year by the death of their late Chairman, Sir Daniel Goddard, and of another valued colleague in Mr. James Randall. Sir Daniel was a man who held many important offices, and received many honours; but he thought that what he valued most was the respect and affection in which he was held in his native town of Ipswich. This was shown in a most touching way at his funeral, which most of those on that side of the table were privileged to attend. He was connected with the gas industry all his life, and his loss was a serious one to it, and especially to the Company. Mr. James Randall was known to many of the shareholders. He spent his whole working life of 71 years in the Company's service. This must be almost a unique record, and reflected the greatest credit on all concerned. The Board valued greatly a good and faithful servant; and he thought Mr. Randall would have said that the Directors of this Company were good masters and pleasant colleagues. These two gentlemen were difficult to replace; but they were fortunate in being able to obtain the services of Mr. A. E. Broadberry, their late Chief Engineer, who had just arrived at pension age, and who had served the Company already 43 years. They all hoped he might beat even Mr. Randall's record. Mr. Surridge had also accepted an invitation to join the Board. He had had a very long connection, directly and indirectly, with the gas industry; and the Board were fortunate to have his experience to draw upon in these difficult times. As regarded himself, he was Vice-Chairman of the Company at the time of Sir Daniel's death, and his colleagues very kindly elected him to take his place. He was fully conscious of the responsibility of the position, but hoped, with the support of the shareholders and the assistance of a fine and loyal staff, to see the Company increase in prosperity and usefulness. ["Hear, hear."]

VERY SATISFACTORY ACCOUNTS.

He was fortunate that day in being able to put before them a very satisfactory statement of accounts. They had been through bad times, but had now, he hoped, weathered the storm; and he thought few would grudge the shareholders the return to reasonable dividends. Looking at the accounts, they would see that during the year the Company had raised no new capital, but, on the other hand, had expended over £52,000 on capital account (gas only). Coming to the main items of expenditure, a sum of £10,106 was for new land. This represented the purchase price of cottages which surrounded the works. There were in all some 55 of these cottages. A few were occupied by their own men, and eventually it was hoped that they would all be. The rental received from the cottages showed a satisfactory return on the capital invested; and the shareholders would, he was sure, agree as to the wisdom of having these cottages abutting on the works in their possession. Under the heading of new buildings and plant £16,000 had been spent, largely at Ponders End, and on the usual additions at Willoughby Lane. The other big item, £18,000 for new stoves and fires, was a very satisfactory one, showing the growing character of the business. The growth of their electricity undertaking had been rapid, and necessitated constant expenditure, both on the works and district. The total capital expenditure on gas and electricity had been £59,945, less £24,935 for depreciation—making a net addition of £35,010. The capital account was now overspent by £132,000. This overspent capital was invested in the various funds—reserve insurance, &c.—and was used in the Company's business. For the first time since the war, they had no overdraft from their bankers. [Applause.]

CO-PARTNERSHIP AND PENSION FUND.

The revenue account showed a reduction in expenditure of £126,000, nearly all under the heading of coal, oil, and coke. Salaries and wages were also down; and the Board welcomed the reduction in rates of £6000. The cost of co-partnership exhibited an increase of £5000, and that of pensions of £2400. They were all glad again to see that the co-partners were receiving good bonuses. The charge on the pensions and superannuation fund was partly due to the retirement of the Chief Engineer, and partly to the fact that a number of new co-partners—51 in all—had to be provided for under the pension fund. He need not go into more detail of the revenue account, but would simply point out that the balance carried to profit and loss account was £109,507, or an increase of £37,555. The electricity revenue account showed a profit of £6007, as against £3391 last year, and thoroughly justified the wisdom of the Company in taking over the supply of electricity in Wood Green. Output was growing very rapidly, and the electricity side of their business showed a handsome profit on the capital invested—the profit being considerably higher than on the gas capital. From the profit and loss account it would be seen that they had been able to put £10,000 to the pension fund. He was sure the proprietors would be very pleased that it was possible to do this, because they guaranteed the stability of the fund; and so, when they had a little money to devote to this purpose, it was a very wise thing to do it. He could assure them that this pension fund was very greatly appreciated by the workpeople. The Directors proposed also to put to the reserve fund a sum of £5075—if the proprietors approved of the suggestions made as to dividend. The amount named was the difference between the statutory dividend and the dividend that the Board recommended, and was the property of the shareholders.

DIVIDEND UP AND GAS PRICE DOWN.

After these charges were met, they were able to pay the dividend proposed and to increase the carry forward by £15,950. The dividend to which they were entitled was £9 2s. 6d. p.ct. on the "A" stock and £7 12s. 6d. p.ct. on the "B" stock. The Directors recommended, however, 8 p.ct. per annum on the "A" and 6½ p.ct. on the "B" stock. This, with the interim dividend already paid, made the dividend for the year 7¾ p.ct. on the "A" stock and 6¼ p.ct. on the "B" stock, or ¼ p.ct. more than the maximum pre-war dividends. Some of them might ask why the Company were not paying the full dividend to which they were entitled. Well, the reply was that the Board were paying the dividend that they hoped to maintain. The standard price given them under the Gas Regulation Act was a proper one at the time, but no one expected it to be fixed for all time, as it was based on very high cost of labour and materials. All that they asked was that they should be allowed to pay some small extra dividend due to foresight and efficiency; and they did not expect, or wish, to benefit by reduction in wages and materials, owing to causes over which they had no control. The price of gas had been reduced during the year from 1s. 1d. per therm to 11d., and was now 10·4d. per therm; and the Directors were most anxious to reduce it further at the earliest opportunity. Some surprise might be felt at the present price of gas. In this connection, he would first like to say that the reduction in price had already meant a reduced cost to the consumer of £180,000 per annum; but the Board were by no means satisfied with the existing price, and were making every effort to reduce it. One of the Company's difficulties had been that they had to do, and were doing, a great deal of building at the most expensive period; and the cost of renewals had been very heavy. The following was typical of the rise in prices. They were now building a large gasholder, for which they asked tenders in 1914. The lowest English tender then was £31,870. In 1921 tenders were again invited, and the price quoted was £120,000. This year they once more asked tenders, and accepted one of £71,000—considerably more than double what they would have paid in 1914. The connections to the holder had to go under the railway, and the total cost of holder, tank, subway, and connections would be about £125,000, certainly £60,000 more than in 1914. They were particularly unfortunate in having practically no surplus plant of any sort when the war began. One very great expense to which they had been put was in the re-starting of the Ponders End works. This was necessitated by the fact that during the war a number of factories were erected in the district surrounding these works, and it was found impossible to send the gas from Tottenham to meet this increased demand. The works therefore had to be re-opened, and the cost was very heavy. Now many of the factories were closed, and the demand in the district was much reduced, and would again be met from Tottenham. The Ponders End works had therefore again been closed; but they would be kept up in good condition, and the Board hoped before long to need them again as the business grew. The increase in therms sold last year was 5 p.ct.

THE QUESTION OF THE THERM.

It would have been noticed that the Company had increased the calorific value of the gas from 450 to 500 B.Th.U. per c.ft. This was only done after very careful consideration; and the Directors were sure that it was a wise move. The main thing was to satisfy the consumers, and the higher heating power of the gas was generally appreciated. He would not trouble them with a very long statement on the therm; but perhaps they would expect him to say something. He thought the therm had come to stay, and that there was really no harm in it. The Company had for years sold their gas on a thermal basis, and to them the change was only one in name. Now that their gas had a calorific value of 500 B.Th.U., one had only to divide the therms by 5 to give the thousands of cubic feet which the meter registered. There could hardly be any people left who thought that higher gas bills were due to the introduction of the charge by therm. It might be of interest to state that the Southgate Urban District Council, part of whose area the Company supplied, when asked to give evidence before the Departmental Committee who had just closed the inquiry as to gas charges, replied:

> "The evidence already given, which appeared in the press, does not appear to support the suggestion that the thermal charge is necessarily unfavourable to the consumer. The Committee have no definite information that would justify them in recommending the Council to offer to give evidence before the Board of Trade Committee."

This showed that in some parts of their district, at all events, there was no particular objection to the therm method of charge.

THE PROPER USE OF GAS.

Now he must shortly refer to the complaints as to carbon monoxide in the gas. There had been several public inquiries into the question of the percentage of carbon monoxide to be permitted in gas; and after the most exhaustive investigation, no limit had been imposed. It seemed to him they could not go beyond this. If one got the best qualified people in the country to inquire into these things, and they reported that they were satisfied that the gas companies of the country were sufficiently sensible to supply the right gas for their consumers, he thought they could really take little notice of the complaints that were being made. Certainly very few of them were justified. There was not the slightest doubt that gas supplied, improperly used, was dangerous; but used as it was in their district, there was practically no danger.

The Company were very careful to see that fittings which they supplied were good and properly fixed. They were sending out gas of almost exactly the same quality as they did pre-war; and he was glad to say there had been no deaths by accident for over 25 years in their district—for which they were all profoundly grateful. There had been cases of suicide by gas-poisoning; and he was afraid that, with the publicity now given to these cases, this form of suicide was becoming more common. It might interest them to know that the district in London where the largest amount of gas per acre was used was round Harley Street. This was, as they were aware, the centre of doctors and nursing homes, and where one would expect to find the greatest care exercised in providing the most healthy surroundings. In cases of sickness, the availability of gas for many purposes—chiefly for fires—was rightly regarded as invaluable. This fact should go some way to satisfy the public that they had nothing to fear in using gas. Its use had saved many lives, while its abuse had unfortunately cost a few.

CONFIDENCE IN THE FUTURE.

There was only one other matter to which he wished to refer—namely, the Draft Order under section 7 of the Electricity Supply Act, 1919. This Order had only just been issued, and it might affect them. The matter was somewhat complicated; but the Directors were doing all they could to safeguard the Company's interests. In conclusion, he would just like to say that, at a time when labour troubles were not infrequent, he believed the relations between the Company and their employees had never been better than to-day. The co-partnership scheme, with which was combined the pension scheme, was regarded with great satisfaction by the staff and workmen. If the workmen trusted the management, there was no fear of any serious trouble or disagreement; and he was confident that this state of things did exist at Tottenham. All of them at that table were genuinely anxious for the welfare of those they employed; and they believed the employees realized this. They had a growing business, a highly-trained, skilled, and energetic staff, and an excellent body of men; and he felt that, in these circumstances, they could face the future with confidence. He begged to move the adoption of the report and accounts for the year.

Mr. H. D. ELLIS seconded the motion, remarking that he could not possibly add to the lucidity and impressiveness of the interesting speech by the Chairman, to which they had just listened.

Mr. H. F. PARDY, referring to the 8 p.ct. of unaccounted-for gas, said he knew this was not all leakage, but if it could be reduced to (say) 5 or 5½ p.ct. it would make a considerable difference to the accounts.

Mr. CONQUER asked what was going to be done with the employees at Ponders End, now that those works had been again closed. In view of the vast number of unemployed at the present time, this was a very important consideration. The Company should try, if possible, to draft these men into their other works.

Mr. BROWN stated that, as one of the Guardians and Chairman of the Edmonton Unemployed Committee, he was constantly having men coming before him who said they had been discharged from the Gas Company. As a shareholder in the Company, he felt this acutely. He thought proprietors would be willing to sacrifice a little of their dividend if they could relieve some of the distress prevailing at the present time.

The CHAIRMAN, in reply, pointed out that the figure for unaccounted-for gas was largely due to wrong registration of meters. During the war, it was very difficult to change the meters; and this was one of the reasons why the figure was a little higher than usual. But looking at the figures for the London Companies, he found all except one this year had over 7 p.ct. of unaccounted-for gas. The Board realized the importance of reducing the percentage to the lowest possible limit. The Directors had felt the necessity of doing all they could to find work for those men who would be thrown out by the closing of the Ponders End works. As a matter of fact, they had for this very reason kept the works open longer than they should. It must be remembered that there were a large number employed in the gas industry who were what were called casual men—they were taken on in the winter, when the demand was heaviest, but at other times there was no work for them to do. The Company were spending a large sum in wages in finding work for the men who had been employed at Ponders End. They realized that every employer was bound to do all he could to lessen unemployment.

The resolution was then put to the meeting, and carried unanimously.

THE DIVIDENDS.

The DEPUTY-CHAIRMAN (Mr. Henry Bailey) moved that the dividends paid for the half year to June last, at the rates per annum of 5 p.ct. on the preference stock, 7½ p.ct. on the "A" stock, and 6 p.ct. on the "B" stock, be confirmed; that for the half year to December dividends be declared at the rates per annum of 5 p.ct. on the preference stock, 8 p.ct. on the "A" stock, and 6½ p.ct. on the "B" stock (all less income-tax); and that the balance of the statutory dividend, amounting to £5075 5s. 11d., be transferred to the reserve fund. He thought he might fairly congratulate the shareholders upon the improved position of the Company, and the ability to pay these dividends. During the war they had suffered very much, and had extremely poor dividends; but now they had reached a better state of affairs.

Mr. G. HAY MORGAN, K.C., seconded the resolution, which was agreed to.

RE-ELECTIONS.

On the proposition of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, Mr. H. D. Ellis was re-elected a Director. The Chairman said the better they got to know Mr. Ellis, the more they appreciated the benefit of his counsel.

Mr. ELLIS, in acknowledgment, assured the shareholders that he would continue to do his best to promote the prosperity of their splendid Company.

The CHAIRMAN next proposed the re-election as a Director of Mr. Hay Morgan. He was one of the newest Directors, but had thrown himself so heartily into the work that he had mastered the details of the Company's work in an extraordinary manner.

Mr. A. E. BROADBERRY (who was received with applause), in seconding, remarked that those who knew Tottenham well would have the same high respect as he himself had for Mr. Hay Morgan, who was an old resident and well-known public man there. When serving under him, he found him a most encouraging and considerate Director; and as a colleague he was everything one could wish.

The resolution was carried, and acknowledged by Mr. HAY MORGAN, who admitted that he had worked hard to qualify himself to serve the shareholders.

The retiring Auditor (Mr. John Eve) was re-appointed, on the motion of Mr. CUNIO, seconded by Mr. BAWCUTT.

Mr. EVE, returning thanks, said he was first appointed in 1914; and contrasting the balance-sheet of that time with the present one, he was surprised at the extraordinary growth of the Company.

REMUNERATION OF THE DIRECTORS AND AUDITORS.

The CHAIRMAN said it would have been seen from the notice of meeting that it was proposed to consider, and, if thought fit, to increase, the remuneration of the Directors and Auditors. On such occasions it was usual for a shareholder to propose the necessary resolution; but his colleagues and he felt it would be more straightforward if they themselves, who knew the facts best, put the case before the proprietors, and then asked one of them to second it. The last increase in Directors' fees was made in 1912, since which time the capital had been increased from £837,000 to £1,511,560; while the income had risen from £300,000 to £876,000. They had absorbed the Enfield Company, and had started the electricity station at Wood Green. During the war, salaries and wages were raised, but there was no increase in the Directors' fees. As they all knew, the Company had been through a very trying time; and to-day they had declared the highest dividend that had ever been paid in the history of the Company. "Field's Analysis of Gas Accounts" showed that the charge for Directors' fees at Tottenham was the lowest in the category in which the Company was placed. This position would have been even more marked if the fact had been noted that the other companies paid Directors' fees free of tax, while at Tottenham the Directors paid their own tax. What the Directors felt would be a fair remuneration would be £4000, to be allocated as they might deem proper. This would mean a charge on the undertaking of about one-fourteenth of a penny per therm, and the cost of Directors would still be one of the lowest, if not the lowest, of the suburban companies—and this in spite of the fact that at Tottenham they were responsible for an electricity undertaking as well as gas-works. Now that dividends were again normal, the Directors felt justified in asking that their services should be properly recognized. As to the Auditors, they were remunerated at the rate of £100 per annum each; and at this figure they could not make any profit out of the work, which was very extensive and excellently done. They could not well ask gentlemen of the distinction of their Auditors to work any longer at this fee. The remuneration, the Board thought, should be doubled. He moved: "That the remuneration of the Directors be increased from £2500 to £4000 per annum, such increase to be effective as from Jan. 1, 1923."

Mr. CUNIO seconded, and urged that when they had men of ability conducting a concern in the efficient manner that the Directors of that Company had done during the 22 years he had been a shareholder, they should be paid a proper fee for their services.

Mr. S. SANDELL supported the resolution, remarking that during the war the Directors had carried on the business under conditions of unparalleled difficulty, and now they had brought the Company back to a state of prosperity.

Mr. RIDDELL pointed out that in the lean years the Directors had not reduced their remuneration, and suggested that it would be better to leave the proposal over for another year, when it could again be considered by the shareholders.

The resolution was then put and unanimously carried, not a single hand being raised in protest.

The CHAIRMAN, in acknowledgment, said he was glad the shareholders approved of the manner in which the matter had been brought forward by the Board.

On the proposition of Mr. INGLIS, seconded by Mr. SMITH, the following resolution regarding the remuneration of the Auditors was carried: "That the remuneration of the Auditors be increased from £200 to £400 per annum, such increase to be effective as from Jan. 1, 1923."

Mr. WILLIAM CASH, who returned thanks, bore out the Chairman's statement that the old fee was not a profitable one.

A VOTE OF THANKS.

Mr. PARDY proposed that the best thanks of the proprietors be given to the Chairman, Directors, and Auditors, and also to the officers, staffs, and workmen for their services to the Company during the past year.

Dr. L. P. SCOTT, who seconded, spoke in a highly appreciative manner of the work of the men, and expressed the hope that the new Engineer would follow in Mr. Broadberry's footsteps.

The vote having been cordially passed,

The CHAIRMAN thanked the proprietors for the vote, and for making the first meeting at which he had presided so exceedingly pleasant. All connected with the Company were doing their very best.

Mr. FUSSELL, who also acknowledged the vote, said he did not know whether many of those present were aware that there were in the United Kingdom only twelve gas undertakings larger than their own. The revival of the co-partnership and the pension scheme was greatly appreciated by the employees, who realized the importance of the protection afforded by the latter.

Mr. HAROLD C. SMITH (the Chief Engineer) declared that the three years he had spent at Tottenham had been the happiest of his life.

Gas Testing at Bedford.—Mr. Phillips (the Gas Examiner) reports to the Bedford City Council that during 1922 he made 26 tests on the gas supplied by the Bedford Gas Company. The average of the tests for calorific value for the year was 468 B.Th.U.; the lowest value recorded being 450 B.Th.U., and the highest 488 B.Th.U. When it is borne in mind, he says, that the Company by Act of Parliament are allowed a margin of 5 p.ct. of their declared calorific value of 450 B.Th.U., he considers the result of the first year's check on their output is evidence that the principle of the Company is to maintain a good quality gas.

LIVERPOOL GAS COMPANY.

The Care of Mains and Service-Pipes.

The Annual Meeting of the Company was held last Wednesday, in the Offices, Duke Street, Liverpool—Mr. H. WADE DEACON (the Chairman) presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, said that before he spoke upon the latter, perhaps they would allow him to make a brief reference to one or two matters of general interest. Everybody had heard and read a good deal about the "therm" of late, and in some places there had been some considerable amount of complaint as to the change in the method of charging for gas. As they knew, the Board of Trade recently appointed a Committee to inquire into the question, and a large amount of evidence had been given. The report had not yet been issued, and so, of course, he did not know what the recommendations of the Committee would be. He might say that in Liverpool they received very few complaints indeed, and this he thought was due to two causes. In the first place, he would like to express their appreciation of the help given by the local Press in explaining the subject; to it they owed a great deal. In the second place, he thought they might claim some credit for themselves, as from the first they showed clearly on the back of every gas bill the relation between the charge per therm and the corresponding price per 1000 c.ft. He was afraid that they had not yet got accustomed to thinking in therms, and so they liked to see clearly stated what was the equivalent per 1000 c.ft. in the old way. With regard to the question of carbon monoxide in the gas, he did not think there was anything he could say that he had not said to them before, except that during the past year their new coal-gas plant at Garston had been completed and put into commission, so that the proportion of water gas in the whole supply had been decreased to some extent. One still occasionally saw and heard statements about the odourless nature of carbon monoxide, which were true enough but quite misleading, for everybody, except those who did not want to understand, knew that pure carbon monoxide was never distributed by any gas company. All the gas they sent out had the distinctive coal-gas smell. Another matter to which attention had been drawn had reference to the condition of gas-mains generally. In their case, special attention had been directed to the question by the disastrous explosion in some houses a few days ago. As the matter would be thoroughly inquired into in the Coroner's Court, it would not be proper for him to say anything about it, except to express the very great regret of the Directors on the death of an experienced and valuable inspector, and to offer their sincere condolences to the relatives and to those who had suffered through personal injury and damage to property. He might, however, be allowed to say on the general question that it was a mistake to think that when once a main was laid it was not seen again or examined until something went wrong. As a matter of fact, inspections took place day by day. Whenever a street in Liverpool was opened-up for repaving or any other purpose the Local Authority notified the Gas Company, and expert pipelayers examined, overhauled, and renewed the mains and service-pipes as required. Mains were drilled to ascertain the thickness of the metal, and the joints exposed were examined. There were many other opportunities for examining the mains, and especially when new service pipes were being laid or old ones repaired. It might interest them to know that the average number of services laid per day was twenty-five. Whenever this was done the main was laid bare, and, in the case of new services, drilled and tapped to receive the end of the service pipe. All the gas-pipes were severely tested both before leaving the makers' works and after delivery, and the mains and services after being laid, and before being covered in, were tested for tightness.

DIVIDEND POLICY.

He would now deal with features of the accounts. The capital account showed a very considerable change this year. At the beginning of 1922 it was overspent to the amount of £245,597, and, owing to the necessity for greater working capital than was required before the war, the bank overdraft was then £482,836. As they would see from the account this year, there was an unspent balance of £282,226, and, as the balance-sheet showed, there was a credit balance in the bank of £190,678. This change in the position was due to the fact that during the year they issued £600,000 of preference stock, and they had paid £40,700 off the mortgage debt. The expenditure on capital account during the year was £46,272, from which had been deducted for depreciation and meters condemned an amount of £14,796, leaving a net capital expenditure of £31,476. Turning to the revenue account, they would see that the income from the sale of gas was £1,249,113, which was about £287,000 less than in the previous year. This was accounted for almost entirely by the reduction in the price of gas, which was 11d. per therm at the beginning of the year, was reduced to 10·4d. for the second quarter, and to 9d. for the last half of the time. The total income from residuals was £103,950 less than in 1921. This arose from the fall in the price of coke which naturally followed the reductions that were made during the year in the price of coal. On the expenditure side of the account, it was at once seen how greatly the reduced prices of coal and oil had affected the cost of manufacture of gas. The decreased cost of these two items alone was no less than £308,570; and owing to the better quality and more regular supply of coal, the make of gas had increased to about 12,800 c.ft. per ton. There were reductions in salaries, wages, and repairs and maintenance, and the total reduction in the cost of manufacture amounted to £476,000. There were reductions in the cost of distribution and management, and rates were less by £9587. This was on account of the agreed net assessment becoming fully effective, and a reduction in the poundage rates. In the special charges they would see that they had transferred £20,000 to the special purposes fund. This they were allowed to do under their Act of 1914. The fund was for the purpose of meeting special charges, such as accidents, and heavy replacements or renewal of plant as they arose from time to time, and could only be used by consent of the Board of Trade. They decided to write-off the cost of issuing the preference stock in five years; and the first quota of £4694 appeared in the account. The total expenditure amounted to £1,349,558, and the difference between this amount and the income was £194,892, which was carried to net revenue account. This account showed that, after including the amount brought forward last year, and deducting the amount required for interest, preference dividend, and dividend at the rate of 5½ p.ct. on the ordinary stock, there was a balance of £72,109 to carry to next year's account. Possibly some of the shareholders might think that the dividend on the ordinary stock should have been larger, as during the war it was reduced to 3¾ p.ct. The Directors had given careful consideration to the matter. It was quite true that a larger dividend might have been declared on the figures; but the Directors had taken the view that it was a wiser policy to declare a moderate dividend which they might reasonably hope to see maintained than to declare a high dividend on the fortunate result of the year's working. This, he thought, was all that he need say about the accounts. They had made the usual careful estimate for the current year; and he was glad to be able to say that they proposed to reduce the price of gas from the present charge of 9d. per therm to 8·4d., after the reading of the meters in March. Expressed in the old way, the price per 1000 c.ft. would be reduced from 3s. 6¾d. to 3s. 3$\frac{9}{16}$d.—practically 3d. per 1000 c.ft.; and it meant that unless the number of therms sold this year increased there would be a reduction of income from the sale of gas of £72,400. Of course, against this they estimated a decrease in the expenditure.

The report was adopted, and a dividend for the half year of 2¾ p.ct. on the ordinary stock was declared.

HORNSEY GAS COMPANY.

The Cheapest Gas in London.

The Annual Ordinary General Meeting of the Company was held last Friday, at No. 5, Great Winchester Street, E.C—Mr. A. M. PADDON (the Chairman) presiding.

The Secretary (Mr. W. E. ROBERTS) read the notice convening the meeting; and the report and accounts were taken as read.

The CHAIRMAN, in moving their adoption, said he thought he might say that both report and accounts were worthy of the attention of the proprietors, because they were eminently satisfactory in all their details. From the report it would be seen that the Company had secured in the period under review a very important increase in the business. He did not claim that it would be a very important one in connection with other companies; but they were not accustomed in the Hornsey Company to sensational or spasmodic increases. Their undertaking had been characterized by a small and steady extension of business during the past twenty years; and 6·6 p.ct. was an important increase as compared with their traditions in that way. They had obtained an Order under the Gas Regulation Act; and this also was a matter of some importance, because it had in certain ways enlarged their powers. Then the report went on to deal with the price of gas. It was quite impossible adequately to consider these accounts unless the price of gas was borne in mind. The facts were set out in detail in connection with the revenue account; and it would help them to understand the special character of the financial statement when they noted that the figures had been derived from a period in part of which they had been charging 9d. per therm, or the lowest price in the whole Metropolitan area. He would not say it was entirely the lowest, because there was another company that had been selling at 9d. contemporarily with themselves; but it was as low as any other. Further than this, the Company were now committed to selling at 8½d; and this put them ahead of their larger neighbour, with whom they had been content to share the honours during the last part of the year under review.

LOW CAPITAL PER MILLION.

Coming to the accounts, there were certain matters to which the attention of the proprietors might be drawn. In regard to the statement of capital stock, it would be seen that the Company had capital powers still remaining to be exercised amounting to over £120,000, of which, he might tell them, the Directors did not at the present time contemplate availing themselves. And when this power to issue was supplemented by borrowing powers to the extent of £34,500, it was evident that the undertaking was perfectly well off in this regard. It would be noted that the total capital received was £276,563; but from this a certain deduction had to be made on account of £33,000 of premium capital which bore no dividend. The total capital expenditure was £260,386, which was equivalent to £371 for every million c.ft. of gas sold during the last year—an extraordinarily low figure.

THE REVENUE ACCOUNT—LOW CARBONIZING WAGES.

Turning to the revenue account, on the credit side they would see that there had been sold 702,510,800 c.ft. of gas, which represented an increase of 43,596,700 c.ft. Notwithstanding this, they had received on account of gas, and from the rental of meters, stoves, and fittings, £6245 less than in the previous year. In regard to residual products they had sustained a similar reduction; the amount received being £6635 less, notwithstanding that the sale of sulphate of ammonia had brought in an increased amount of £1476. The total decrease in receipts on revenue account was £12,838; but, on the other hand, the expenses had fallen by £14,533; the difference between these sums—£1695—was the addition to their profits as compared with a year ago. On the debit side of the account there was just one figure to which he would like to refer—the wages for carbonizing, which came out at 2·71d. per 1000 c.ft. This was a very extraordinary figure, and it was the key-note to the general nature of the results. It was the lowest figure that he personally knew of; and, after inquiry, he could assure them that it had been taken out with due care, and represented the high degree of economy which had been attained by Mr. Buckley in connection with his carbonizing process. This efficiency did not confine itself to one particular detail; this pitch of excellence existed right through the works. In fact, it must exist to produce such results as he was privileged to put before them that day. They had not starved the undertaking in any way with regard to depreciation and repairs, in order to show a satisfactory result. All these items, whether repairs

and maintenance of works, pipes, meters, or stoves and fittings, had been adequately, and even amply, dealt with. The result of it all was that they carried a profit of £17,280 to the profit and loss account, which showed how it was disposed of. They brought into the account £15,881, and to this was added the profit for the past year and the small amount of interest, which made an available total of £33,524. After they had paid their income-tax—no mean achievement in these days—a small amount for interest on consumers' deposits, the interest on debenture stock, and the interim dividend, and had (subject to the approval of the proprietors) carried £1000 to the reserve fund account, there was left a balance of £21,322. If they distributed the dividends now recommended, there would be left to carry forward £16,065, which was an increase of £184 over the amount which was brought into account. The special purposes fund was of substantial dimensions—nearly £12,000; and they might look to see this further increased by its own interest, and perhaps by some additional contributions. To the reserve fund, as he had already pointed out, the Directors proposed to add £1000 from the profit. It had always been a peculiar feature of this undertaking that the reserve fund had exhibited somewhat limited proportions. Many years ago he drew the attention of the Board to the matter, and the reply was that money of that sort was better invested in the Company, where it gave a higher return than if otherwise invested. There was a great deal to be said for this view; but inasmuch as it was the proprietors' money, he thought there was also something to be said in favour of putting it where it could be definitely appropriated at any given moment—and the strictly legal position was that it should be so invested. The whole of their reserve fund had been invested in this manner, so far as they were in a position to do it; the only portion uninvested being what they were asking the proprietors to sanction that day. He would look forward to the time when this reserve fund would be rather increased from what it was at the present time; but it must be realized that the carry-forward was an important one, and that this to a certain extent qualified the size of the reserve fund. The benefit fund had been maintained at a figure necessary to meet their requirements, with a balance. There was only one other interesting figure in the accounts, and that was that their Engineer had carbonized 37,000 tons; and as he had no stock of sulphate of ammonia when he began the year, he had apparently made 436 tons and sold 423 tons. He (the Chairman) did not know how this was done; but, of course, Mr. Buckley would realize that if he did these things, they would expect him to go on doing them. This was a particularly good figure, because 100 tons of coal should yield a ton of sulphate, and the yield in this case had been much more. It was yet another instance of the very good working to which he had referred. The suspense account £2000 appeared on the debit side of balance-sheet. He had had considerable experience of suspense accounts, and had generally found them on the other side; but the Board had quite properly put it on the debit side, which meant that out of the figures shown they had been able to sequester the sum of £2000 to meet requirements which they had ascertained would accrue during the current year. They had cash on deposit to the extent of nearly £15,000; and in the capital account it would be noticed that the balance of capital was £16,000. It was not always that one saw a balance of capital where one could lay hands on it when it was wanted; and this was one of the favourable features of the statement. This, he thought, was all he had to say about the report and accounts.

THE PRESS CAMPAIGN.

There were, however, two other matters upon which he felt perhaps he might be expected to say something, if only from the consumers' point of view. They were well-worn subjects; and people must by this time be heartily tired of one of them at least. He was sure that those who started the hare had failed to catch it, and would willingly relinquish any further efforts to discredit the therm. One would imagine from the criticism directed against the gas industry that they had devised the therm to further their own interests; but, as a matter of fact, the gas industry did not devise the therm at all. The Government, on the advice of experts, imposed it upon gas undertakings as a method of measure. He did not think the industry as a whole was at all anxious to adopt it; but it had been adopted, and it possessed certain definite advantages, which were all in favour of the consumer. By reason of the therm, the consumer got exactly what he paid for. When formerly he paid for 1000 c.ft. of gas, he got one thing in one place and another in another; but however assiduous a critic might be, he could not establish any other fact than that the therm had an equivalent value, whatever its charge. This was to the advantage of the consumers; but he could see no possible commercial advantage to the gas undertaking. True, there was an advantage technically to the gas undertaking, because if they wanted to compare results, and ascertain the relative efficiencies of different workings, they had an absolutely definite and reliable criterion which would help them as engineers and administrators. He thought they could with confidence await the report of the Committee who had inquired into this matter.

COMPOSITION OF GAS PRACTICALLY UNCHANGED.

The next agitation they had had to deal with was a very old subject indeed. It had been represented in the Press that there had been a change in the character of the gas supplied by different undertakings, and that the danger from gas was greater to-day than had formerly been the case. The fact with regard to this undertaking—and it applied to almost every other, whether municipal or company owned—was that the gas supplied to Hornsey consumers to-day was the same in its composition as it was twenty-five years ago. There had been no change whatever. He could speak definitely and authoritatively on this point; but he would go further. So far as any practical significance to the consumer was concerned, the composition of the gas distributed by the Hornsey Company to-day was the same as it was when the Company was founded in 1866. He did not say there had not been a small change of composition about a quarter of a century ago; but he maintained that this change could have had no practical effect whatever on the use of gas by the consumers. By playing, he feared, on the perfectly inexcusable ignorance of the public, a great deal of misapprehension had been induced by reference to carbon monoxide as present in coal gas; and it was represented that carbon monoxide, if breathed, would destroy life. Well, so would anything else, except air. Try breathing anything but air, and one would go quietly out of existence sooner or later. Therefore it was not a great advance in technical knowledge to tell people that if they breathed carbon monoxide they would die. Then it was said that it was inodorous. There was four times as much hydrogen as carbon monoxide; and that was inodorous. There was also four times as much marsh gas; and it was inodorous. But none of them was ever sent out except when associated with what might perhaps be termed the vilest ingredient anyone could devise—in other words, the aromatic hydrocarbons which were the invariable concomitant of gas. It was therefore rather unscrupulous to talk about inodorous carbon monoxide. In their attack on the gas industry—he did not know what motives lay behind it—these people had implied, and had certainly convinced a large number of the public, that gas companies had introduced carbon monoxide into their houses for the first time; but so long as there had been any form of domestic dwelling, so long as there had been any form of fuel combustion, there had been the production of carbon monoxide. As a matter of fact, carbon monoxide was the inseparable concomitant of combustion of any form of carbon; and its production was going on in every hearth and every room in every house. If the gas supply were taken away to-morrow, carbon monoxide would still be the constant associate of humanity, wherever it tried to warm itself or cook its food. The great fact was that there was no greater risk in their district, or to any one of their consumers to-day, than there was twenty-five or fifty years ago. They might leave the consumer to deal with the matter in the light of his own experience, and to appreciate the fact that the benefits conferred upon him by the use of gas were immeasurably beyond any possibility of risk there might be.

Mr. A. F. PHILLIPS seconded the motion, which was carried unanimously.

DIVIDENDS AND RE-ELECTIONS.

The CHAIRMAN next moved: "That there now be declared dividends for the half year ended Dec. 31, 1922 (being the final dividends for the year), as follows: On the preference stock, 5 p.c. per annum; on the consolidated 'A' stock, 12½ p.c. per annum; and on the consolidated stock 9½ p.c. per annum (all less income-tax); that such final dividends be paid on March 1, and that the sum of £1000 be carried to the reserve fund."

Mr. MILES seconded this, and it was agreed to.

The CHAIRMAN proposed the re-election as Directors of Mr. A. F. Phillips and Mr. J. M. Miles. He said both these gentlemen had contributed to the satisfactory state of affairs that had been laid before the proprietors that day. Both rendered invaluable services.

Mr. G. W. CAREY seconded the resolution, which was unanimously passed.

The retiring Auditor (Mr. E. L. Burton) was reappointed, on the motion of Mr. K. R. MACKAY, seconded by Mr. F. W. CROSS.

VOTES OF THANKS.

The CHAIRMAN proposed a hearty vote of thanks to the Engineer and General Manager, the Secretary, and the other officers and staff, for their services to the Company. The accounts showed how well this vote was deserved. Both Mr. Buckley and Mr. Roberts had done splendid work during the period under review; and they were very deeply indebted to them.

Mr. MACKAY seconded the vote, which was cordially passed.

Mr. J. W. BUCKLEY (the Engineer and General Manager), on behalf of himself and his colleagues, returned thanks. They were all, he said, very proud to serve a Company which occupied the distinguished position of selling the cheapest gas in London. It would be their earnest endeavour to retain this leading position. During the six months to Christmas their working had been very closely scrutinized on behalf of the Gas Referees; but on no single occasion had their gas been found to be below the declared value of 470 B.Th.U. On the contrary, the average had been 483 B.Th.U., or 3 p.ct. higher than the declared value. The complaints from the district were absolutely at a minimum—they had never been at a lower number per thousand consumers than was the case to-day. This spoke volumes for the Company, and also showed that the consumers were reasonable. For the results generally, he did not desire to take any special credit; he believed any gas engineer could do what they were doing. What he did take credit for was the working of the concern with the greatest economy in every department, having due regard to efficiency.

The proceedings were brought to a conclusion with a vote of thanks to the Chairman and Directors, on the proposition of Mr. G. F. CHURCH, seconded by Mr. F. G. PILLEY.

Kirkham Gas Company.—The Directors of the Kirkham Gas Company report a profit of £834 on the half-year's working, which with £1676 brought forward from last half-year gives a total balance of £2521. After deducting loan interest and dividends previously paid, there remains a disposable balance of £2184. A dividend of 8 p.ct. (less tax) per annum for the half year is recommended.

Exeter Gas Light and Coke Company.—The sale of gas by the Company during the year 1922 increased by 108,752 therms, which is equivalent to nearly 23 million c.ft. In November last the Company offered for sale by public auction 2000 £10 new ordinary shares, which realized an average price of £12 0s. 11d. per share. The Board recommend the payment of dividends for the year of 10 p.ct. per annum on the original stock, and 7 p.ct. per annum on the new ordinary shares, less income-tax.

Slot-Meter Test Cases at Wirksworth.—At the Wirksworth County Court, a number of test cases against slot-meter consumers were brought by the Wirksworth Gas Light and Coke Company, Ltd. The Company sued eight gas consumers for small sums representing the difference between the amounts in their prepayment meters (which were set to deliver gas at 5s. 7d. per 1000 c.ft.) and the basic charge of 7s. 11d. per 1000 c.ft., as notified to the consumers by printed circulars. The difference was to be calculated and collected at the time the meters were emptied of coins. The defendants refused to pay the difference; but the Registrar (Mr. W. Sealy Fisher) made an order in favour of the Company in each case—the money to be paid by instalments.

CROYDON GAS COMPANY.

Through illness, Mr. Charles Hussey, J.P., Chairman of the Croydon Gas Company for over thirty years, was absent from the annual meeting held in the Lecture Hall of the Company's Offices, Katharine Street, on Friday afternoon. There was a large attendance of proprietors; and Mr. THOMAS RIGBY (Deputy-Chairman), who presided, in moving a resolution of sympathy with Mr. Hussey, mentioned that he had been absent from the meetings only twice during the thirty-two years he had been associated with the directorate.

The SECRETARY (Mr. W. W. Topley), in presenting the annual statement prepared by the Chairman, referred to the death of Mr. J. W. Helps, formerly for many years Engineer to the Company. Mr. Helps had left a widow and three children—the latter still at school; and he felt sure the proprietors would approve the action of the Directors in continuing the amount of his pension, to provide a sum for the education and maintenance of the children.

Dealing with the changes introduced by the Company's new Act, Mr. Hussey recorded that it was eighteen years since the last Act specially affecting their constitution and powers was passed; and several provisions that experience had shown to be advantageous were now brought into force. In place of five stocks, paying dividends at the pre-war rates, with a wide range down to 5 p.ct., into which their ordinary capital was divided, they had now two only, paying at the present time 6 and 5 p.ct. Mainly as a consequence of this simplification, the two stocks were becoming better known to investors, with the result that they had improved in capital value. Partly, of course, this was due to the general tendency towards re-establishment of gas stocks in public favour as a sound investment. Mr. William Russell, was to be congratulated on having in January last completed a service of sixty years with the Company in capacities progressively changing from that of a junior clerk to that of a director. [Applause.] His experience was a gratifying instance of the possibilities of good service, and one that should furnish incentive and encouragement to others. Probably Mr. Russell, better than any of them, appreciated how great had been the growth and development of the Company during his long span of working life. The Directors had recently come to a decision to recognize the completion on the part of any employee of 25 years' satisfactory service by the award of a certificate accompanied by a suitable gift. The first presentations would be to over ninety recipients. There would be established among the co-partners, who numbered 800, a fund to provide pensions for widows and young children. The contribution estimated to be necessary for these was wholly paid by themselves, the Company guaranteeing the benefits. The guarantee given by the Company of the benefits of this fund and of the pension fund had been commenced with an appropriation of £5000. The output of gas was up by 9 p.ct., and the sales had now reached well over 2000 million c.ft. a year. This increase was really two years' increase in one, since in 1921, owing to conditions of weather and the urgent necessity of fuel economy by the public, there was no increase over 1920. The number of consumers had been augmented in the year by 1390. The Company had been able to effect a continuous and gratifying reduction in the price of gas. Five successive reductions had been made since Christmas, 1921, amounting in all to 3·8d. per therm, or a total reduction of 28 p.ct. As from Jan. 1, they had increased the declared calorific value of the gas from 470 to 500 B.Th.U. The final outcome of the year's working was that, after meeting special charges and appropriations to funds amounting to over £34,000, and earning dividends and interest totalling together £84,000, they would carry forward £16,320, as compared with £8620 brought into the account from 1921.

The report and accounts were passed with acclamation, and dividends were declared at the following rates per cent. per annum: Preference stock, 7½; sliding-scale stock, 6; maximum dividend stock, 5.

Mr. Thomas Digby and Mr. Henry Woodall were re-elected Directors, and Mr. John Jones was re-elected Auditor.

The remuneration of the Directors was increased to £3600, to be divided as they might determine. At present the remuneration is £2150, free of income-tax, which involves a total charge on the Company of £2724 per annum. Under the new arrangement—proposed by Mr. W. CASH, and seconded by Mr. J. W. BUSH—the Directors will pay their own income-tax.

Thanks were accorded the Directors, on the proposition of Dr. J. H. RODMAN; and Mr. SAMUEL SPENCER (a Director) praised the services of the officers, staff, and workmen—particularly mentioning Mr. Archibald Caddick (the Engineer and Works Manager), Mr. W. W. Topley (the Secretary and Accountant), who was congratulated on successfully piloting the Company's new Act, and Mr. W. J. Sandeman (the Distributing Engineer and Sales Manager).

Claim for Gas Used.—A claim for £49 9s. 7d. has been entered by the Enniscorthy Gas Company for loss of gas consumed in the Court House while it was occupied by the anti-Free State (or Irregular) forces, from May to July of last year. These forces destroyed the Court House by fire before evacuating the town. The claim is made on the county authorities.

Gas Light and Coke Company's Prepayment Consumers.—The Gas Light and Coke Company are adjusting their slot-meters to pass 16 c.ft. of gas for a penny, or 192 c.ft. for a shilling, instead of 13 c.ft. for a penny or 156 c.ft. for a shilling as previously. The Company's notice to consumers adds: "Money will therefore be returnable at the rate of 2½d. for every 1000 c.ft. of gas consumed."

Rossendale Union Gas Company.—The report of the Company, for the half year, states that the sale of gas showed a decrease of 7·9 p.ct., compared with the quantity sold during the corresponding period of the previous year. There had been expended during the half year £592 on new services, and £536 on new meters. The profit for the half year was £5156; and dividends were being paid as follows: On the original, new, ordinary, and preferred ordinary shares, 10 p.ct.; on the 1876 Act shares, 7½ p.ct.; on the Amendment Act and new Amendment Act shares, 7 p.ct.; and on the new preference shares, 5 p.ct.

THE NORTH-EAST COAST COAL TRADE.

From Our Own Correspondent.

There have been no signs during the week of any falling-off in demand—rather the contrary. And naturally, as more and more coal is sold for future positions, higher and higher prices are asked, and in many cases given. "The price of coal" for any given period is beyond even the best authorities to state. A good example of the prevailing conditions is given by a would-be buyer who circulated inquiries round the collieries for a twelve months' period. He received offers for similar brands varying by about 10s. The strike at the three Harton pits, referred to last week, has not yet ended. The loss of coal has therefore amounted to some 6000 tons a day for more than a fortnight—a serious matter in a market so short of supplies. There is every indication, however, that work will be resumed early in the week, on the recommendation of the Federation Board.

The Northumberland wages ascertainment for March and April has come through, and, like that for Durham recorded last week, shows a slight reduction.

There is again talk of American competition in the Italian market; but little attention is being paid to the matter. The demand for Germany, France, Belgium, and other European quarters is far in excess of what can be satisfied, and really it appears quite possible that high prices may rule even beyond the half year. Collieries are, it seems, in many cases letting-down their regular customers, especially at home, as lightly as possible. Apart from such business as this, however, they show no anxiety to fix up for any period, preferring to wait and see what comes along.

Once again coking coal has led the way. Sales have been made at 30s. up to the end of the year, and towards the end of the week 35s. up to June 30. Good qualities are now asking 40s. These figures are significant to gas companies, as many of the Durham collieries can supply either "gas" or "coking," whichever offers the better market. Wear Specials and, in fact, all qualities of gas are practically sold out for March, and little is available for April. The daily papers still give quotations of 28s. to 32s. for bests; but these are quite worthless. Regular customers might be "obliged" at the former figure, while odd buyers would certainly be lucky if they could find anything even at 35s. Most collieries would probably be glad to buy back at 28s. coal sold for March-June at the end of last year at what was then—the good price of 23s. 6d. or thereabouts.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

There has been a big Continental demand for coal from Yorkshire during the past week. The French are not getting coal from the Ruhr in anything like the quantity they expected; and if these hopes are not realized, the French will have to come upon the English market for supplies. The German demand is well maintained, and is levelling prices up. Last week there was a big request from exporters for immediate and forward deliveries of hard steam, screened gas, washed and dry doubles, coking smalls, and furnace coke. Collieries reported generally that they were fully sold for the majority of their outputs—some of them to the extent of a few months ahead. The industrial situation remained unchanged, although many furnaces were reported to be out of commission owing to the lack of coke. Coke rose to high prices; furnace coke fetching 50s. a ton. Coal was appreciably dearer, all the cheaper sorts particularly so; and an advance of miners' wages at the end of this month will tend to hold prices firm well on towards June. Little, if any, increase is expected in the price of best qualities, for which Germany is not competing. There is an improvement in the demand for gas coal, both for shipment and home account. Prices ruled as follows: Best South Yorkshire hards, 28s.; washed doubles, 28s. 3d.; washed singles, 27s. 6d. to 28s.; washed smalls, 21s.; West Yorkshire Hartleys, 26s. 6d.; rough slack, 18s. 6d.; dry smalls, 14s., and coking smalls, 17s. 6d. per ton, all f.o.b. Hull. In Lancashire, the demand from the cotton trade is still poor; but the general demand is larger. Prices all round are fractionally better than they were.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

There is no development in this area so far as the gas-coal trade is concerned. The public and private undertakings being with few exceptions well covered, the new inquiries on the market are so insignificant as to be a negligible factor. It would cause surprise if any attempt were made on either side to secure a readjustment of contract prices for the March-June quarter. More gas is being consumed for industrial purposes. The increase is certainly not greater than had been anticipated, however; and it finds managements prepared. Generally consumption is well within the estimates. In these circumstances undertakings are content to wait. There is a good deal of confidence that when the time for making fresh annual contracts arrives, buyers will be able to negotiate in a more favourable atmosphere than now prevails. Though some collieries quote rather higher prices for new business, the Continental demand has not seriously disturbed the equilibrium; but the situation has, of course, become more obscure. It is stated that coal has been sent to Hull much faster than it can be shipped. During the past week deliveries to some of the gas-works have been delayed more than at any previous time this winter. The cause is traced to transport dislocations. Collieries have been ready and waiting to load the coal; but the wagons have not always been available. The snowfall and fog have no doubt interfered with traffic. There is no tension in regard to industrial and household coals. As to coke, the famine conditions remain unrelieved, and prices continue to appreciate.

BRITISH INDUSTRIES FAIR (BIRMINGHAM).

Gas and Kindred Exhibits—A Smaller Display Than Last Year.

The Birmingham section of the British Industries Fair opened at Castle Bromwich, a few miles from the centre of the city (but easily accessible by train or motor omnibus), on Monday of last week, and will remain open until March 2.

The LORD MAYOR OF BIRMINGHAM (Alderman D. Davis), who is the President of the Fair Council, presided at the inaugural luncheon on Tuesday (as he and other members of the Council attended at the White City on Monday, and were presented to the King and Queen); and on Thursday a visit was paid to the Fair by H.R.H. the Duke of York, whose interest in industrial matters, particularly on the side of welfare, is well known.

THE EXHIBITS.

The exhibits of interest to those engaged in the gas industry were not numerous, and really not representative, though there were a few of real merit.

The Fair, which will probably be held next year in May (as it is thought the rigours of an English winter are sufficient to deter many overseas buyers from visiting this country), is under the auspices of the Board of Trade, and is jointly organized by the Birmingham Municipality and the Birmingham Chamber of Commerce. At the luncheon on Tuesday, the Lord Mayor made it perfectly clear that the Corporation of Birmingham fully recognized their obligations in relation to the promotion of trade and commerce; and anything they could reasonably do in this direction, having regard to the interests of the ratepayers, they certainly would do. Councillor C. Canbridge is this year the Chairman of the Birmingham Fair Council, and in a speech on Tuesday expressed regret that there was a falling-off in some of the large firms who had stands in previous years. He believed they had made a mistake, and that next year they would again be represented.

Manufacturers Optimistic.

There is a greater feeling of optimism among traders and manufacturers. The belief is entertained pretty generally that the rock-bottom of the trade depression has been reached, and that the tide of trade has set in. Certainly one remark is regularly made by overseas representatives and buyers—that stocks of manufactured goods abroad are negligible, and that buying will depend upon the recovery of the exchange. In many countries some progress is noticeable in this direction—chiefly in British colonies and dependencies. The attendance of buyers this week has been only moderate, and business generally may be described as patchy, though, of course, some manufacturers, particularly the hardware firms, express themselves as satisfied. But everything depends upon the individual standing and enterprise of the various exhibitors. Engineering is also a good feature of the Fair; and there are some very representative displays in the Building Construction group.

The Lighting of the Building.

As in previous years, the Birmingham Gas Department have an excellent stand; and it may also be mentioned that the two "Tilley" gas compressors fixed on the stand are each of 1000 c.ft. per hour capacity. They are used for raising the pressure of the gas for supplying the 43 overhead high-pressure lamps for the general lighting of Building "A." Each compressor is run alternately. The gas is raised in pressure from 2 in. to 60 in. water column. As last year, three large buildings are occupied, though the third is used merely for commissariat and decorative purposes.

Birmingham Gas Department Stand.

The Corporation Gas Department's stand is devoted to two sections—the work of the Industrial Research Laboratories (which has been arranged by Dr. C. M. Walter, the Engineer-in-Charge, and Mr. V. E. Green, the Assistant Engineer, who have with them a staff of metallurgists and other specialists), and furnace work. The display certainly emphasizes the important place which the Research Laboratories have in the industrial life of Birmingham. The application of scientific knowledge in industry was certainly never more necessary than at the present time, when efforts are being made to capture trade hitherto in other hands. Already much valuable research work has been conducted in the laboratories; and at the Central Physical Laboratory, at the Council House, a large Avery testing machine is being installed at the present time.

Testing Machines and Heat Treatment.

The Gas Department's stand is near the main entrance in Block "A," and includes a complete series of small machines for testing the properties of both raw material and finished goods. In another part of the exhibit, a well-displayed series of modern type gas-heated furnaces, burners, and heating appliances is shown. Most of the manufacturers of Birmingham are, of course, already aware of the activities of this department of the Corporation; but it may be well to mention that, owing to the improvement in trade, which has now been felt for some considerable time, the Laboratory has had to extend its heat-treatment shops, and also certain sections of the Laboratory itself. Further, for the benefit of manufacturers, new showrooms have been opened recently in Edmund Street, where practically every type of furnace and industrial heating plant can be seen in operation. The testing apparatus on view includes the following: A 10,000 lbs. tensile testing machine; a torsion testing machine for determining the torsion moduli of different specimens of material; an Erichsen machine, which has been found extremely useful in ascertaining the drawing properties of sheet metals in connection with brass work; also, a dead-weight operated Brinell testing machine for estimating the Brinell hardness of various metals and alloys. In addition, some fine samples of fractures of heat-treated steels are shown, as well as a variety of finished components which require special heat treatment. Other exhibits include a projecting apparatus, by means of which photomicrographs of metals and alloys are projected on to a screen for visual examination. The arrangements are such that any firm who are exhibiting may have material tested by members of the Laboratory staff, and obtain certificates.

The furnace side includes, *inter alia*, a Radiation natural-draught oven furnace, of special interest in that the Department have installed it with a proper arrangement of broken flue, the design of which is clearly shown by two blue-prints in evidence at the sides. There is a Brayshaw high-speed steel furnace; and a neat brazing hearth of general workshop utility, having a blower combined and a spring-actuated by-pass from the blow for the purpose of cooling tools placed on the ledge which releases the valve. Messrs. British Furnaces, Ltd., are represented by a rivet-heating furnace embodying a tank correctly insulated—having double casing packed with cotton silicate. High and low-pressure soldering stoves by Tilley, Keith and Blackman, and Wilkes are exhibited; and there is a small muffle for laboratory or jewellers' use. There is a show-case containing much of interest in the way of small articles which are finished by gas treatment—photographs, &c., enamelled, stampings annealed, nibs hardened, and so on. The photograph on the cigarette-case presented to H.R.H. the Duke of York (see below, and a short article in the front of this issue) was prepared by treatment in a gas-muffle.

Mond Gas and Residuals.

An extremely interesting display by the South Staffordshire Mond Gas (Power and Heating) Company shows the really remarkable use that is made of residual products. It has been well said, indeed, that no one can truly estimate the potentialities of coal, or the products that can be obtained from it. The exhibit of the Company exemplifies this truism; and the range of specialities, all derived from bye-products of the manufacture of Mond gas, is remarkable, both on account of the way in which science has brought before industry preparations of utility for many trades and because it illustrates the ever-increasing resources of coal. In the manufacture of Mond gas there are produced oils which are entirely free from poisonous substances, such as carbolic acid, but which have a germicidal value far superior to it. These oils form the basis of a unique series of disinfectants, sheep dips, cattle washes, &c., all of which show great potency in destroying the lower forms of life, such as disease germs, parasitic and fungoid growths, but are entirely innocuous to the higher forms of life. This property allows of the use of such preparations for internal as well as external disinfection, and the preparations are successfully used for intestinal disinfection, for which ordinary coal-tar products containing carbolic or its derivatives cannot be used, owing to their poisonous nature. It is interesting to learn that, in view of the serious outbreak of foot and mouth disease which occurred in this country last year, and of which there are still sporadic outbreaks, one of this Company's preparations has been found to be a complete cure for, and preventive of, the trouble. Another product is a non-poisonous and non-corrosive disinfectant many times more powerful than carbolic acid. Other products of the Mond Company are a wood preservative stain and insecticide. A large range of bituminous paints is also shown, and also specimens of sulphate of ammonia, fertilizers, &c., all derived as bye-products in the production of Mond gas.

Low-Pressure Gas Tinmen's Stoves.

The Tilley High-Pressure Gas Syndicate, Ltd., show, among other things, the Tilley low-pressure gas tinmen's stoves. These are made for use with gas at ordinary pressure, and are claimed to be more economical and better than the ordinary type of gas-heated soldering stove. In this stove perfect combustion is ensured, and there is no smell. Firebricks of special design form the lining, and the effect of this is to conserve the heat generated and reduce radiation losses. The stove may be easily cleaned.

Gas-Mantles.

Messrs. Lighting Trades, Ltd., of Garratt Lane, Wandsworth (who occupy a part of the large stand of Messrs. Nobel Industries, Ltd.), show specimens of the many types of "Ironclad" incandescent mantles which they manufacture, as well as specimens of raw materials and chemicals used. A special display rod, with a series of arms each holding a mantle, demonstrates very effectively the activities of the firm. There are also examples on view of various systems of lighting, including high-pressure gas.

Gas-Cookers.

The display of gas-cookers, though much smaller than that of last year, was not without interest. Messrs. Stoves, Ltd., of Warrington, exhibited a wide range of cookers, including the "Bakerloo" series, on legs, which are fitted with either central or side oven burners as required. The burners have efficient gas and air regulators, and the hot-plate is arranged with a series of solid flame "Fan" burners, and one revolving grill burner. There are also shown a number of standard and other examples of cookers, as well as the "Perfect," an inexpensive series of double-cased sheet-steel cookers. The "Edna" bijou ovens, of handy useful size, which can be used with a gas-ring, receive a fair amount of attention. The "Little Imp" radiator and the "Sun Ray" portable gas-heating stoves, as well as geysers, are also good features.

Messrs. Rippingilles' Albion Lamp Company, Ltd., Birmingham, have a rather comprehensive side in which the Ralc-Fire radiator is specialized. It is portable, and can be placed just where the heat is needed.

The Forth and Clyde and Sunnyside Iron Companies, Ltd., Falkirk, show a useful range of cookers, including the "Easyreach" cooker oven, on stand, with hot-plate. The firm's standard cookers, too, are given prominence. These embrace the "Regulus" and "Gasecon," on a white enamel stand with an oven, lined with asbestos, easy of access. The width of the "Regulus" is a useful and pleasing feature;

and the "Gasecon" is already known to our readers. An enterprising line which is being exhibited by the firm is the No. 9 "Duplex" gas and coal combination grate—an arrangement which is particularly applicable to the modern type of small house. On one side of a wall is fixed the grate; and in the kitchen, back-to-back with it and connected beneath the common flue, is an oven—so that the working man's thrifty wife can use but one fire and still have her separate kitchen.

Pipes and Tubes, Regulators, Glassware, &c.

The British Mannesmann Tube Company, Ltd., specialists in the manufacture of steel tubes suitable for all purposes, have a magnificent display of weldless steel work. They show examples of various joints—loose flange, fixed flange, and double border—and pipes of all sizes for all purposes. There is a demonstration set of the "Victaulic" joint, comprising a jointed pipe, a pressure gauge, a deflector, and pointer; and the stand is well marked out by a pair of enormous ship's davits.

Of smaller wares, Messrs. Serck Tubes, Ltd., have an interesting stand. They specialize in tubes solid-drawn from all non-ferrous metals, and in bending and pressing of every kind. Their headquarters are in Warwick Road, Greet, Birmingham.

Shortage of time on the occasion of our visit to the Fair prevented more than hurried account being taken of many exhibits of interest to the gas industry; but special mention must be made of some. Messrs. James Stott & Co., of Birmingham, are showing a number of boilers suitable specially for stillroom use; their forte being hotel, restaurant, and canteen equipment. The "Stott" gas-governor is of wide renown, and in their exhibit is given particular prominence through the medium of a leaflet quoting "governor" passages from the recent therm inquiry.

Messrs. Ackroyd and Best's display of glassware is as striking and comprehensive as usual; and they are showing, besides a variety of lamp-room equipment, a refractory furnace cement.

Messrs. Gibbons, of the Dibdale Works, Dudley, are well known to the gas industry as makers of charging machines and conveyors, and as specialists in refractories—silica bricks, and all grades—for retort-settings and industrial heating generally; and all branches of their work are represented for the public information.

Boilers and superheaters, and the "Kennicott" water softener, may be found at the stand of Messrs. John Thompson, of Wolverhampton; and we noticed, among many interesting culinary appliances, the "Record" gas-copper of Messrs. M'Dowall, Steven, & Co., Ltd., of Falkirk.

The tile work and complete surrounds of Messrs. Wade & Co., of the Flaxman Tile Works, Burslem, remind one of the great development that has taken place in this work, from the artistic and the utility points of view; and another present-day utility may be instanced by reference to the large and interesting stand occupied by the British Fibrocement Works, Ltd., of Erith and the provinces, whose "Fibrent" sheeting might be found on many roofs within the country's gas-works.

Miscellaneous.

The Cable Accessories Company, Ltd., of Tividale, Staffs., make a display of enamelled iron gas-shades. Messrs. Geo. Salter & Co., Ltd., of West Bromwich, show gas-irons and the like; Messrs. John Harper & Co., Ltd., of Willenhall, a variety of gas-heaters; Messrs. Izons & Co., West Bromwich, cast-iron radiators; and Mr. John Singleton, Birmingham, artistic fittings for gas lighting. Incandescent gas-burners were featured on the stand of Messrs. John Smith, Ltd., Mitre Mills, Birmingham, and Messrs. Lighting, Ltd., of Manchester, who are manufacturers of "Solar" gas fittings, lamps (high and low pressure), and burners, made an interesting display. On the stand of the National Benzole Company, Ltd., are shown examples and instances in the production of the new motor fuel—national benzole mixture; also samples of "N.B.C." lubricating oils, &c.

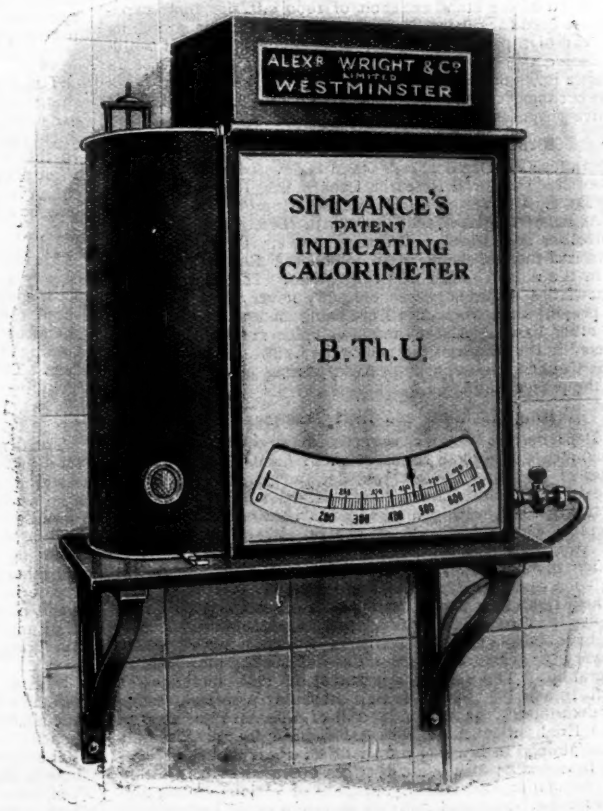
The Fair is being fairly well attended; but comment was general upon the smallness of the gas section as a whole compared with that of last year.

VISIT OF H.R.H. THE DUKE OF YORK.

H.R.H. the Duke of York visited the Fair on Thursday last, and was accorded a most popular reception. He was accompanied by the Lord Mayor of Birmingham (Alderman Davis), who, on arrival, introduced H.R.H. to the members of the Council, and next to Alderman J. H. Lloyd (the Chairman of the Gas Committee), who asked the Prince's acceptance from the Gas Department of a beautiful gold cigarette case, which bears on the front the photograph of the Prince and his fiancé, Lady Elizabeth Bowes-Lyon. This is a fine example of reproduction in ceramic colouring. The photograph is reproduced on a collodion film, which is laid on a white ground of enamel. This is fused in a gas-heated muffle at a temperature of about 1500° Fahr., which fixes the ceramic reproduction to the white enamel base. Over the photograph is placed a layer of finely powdered transparent glass enamel, which, on being fired in a gas-heated muffle, melts and forms an enamel surface. It is then polished on a high-speed felt bob. The portrait is practically indestructible. Dr. C. M. Walter, the head of the Gas Department's Research Laboratories, who was introduced to H.R.H., explained to him the various furnaces and tensile testing machines on the Gas Department's stand. The Prince was particularly interested in the latter, about which he asked various questions, and mentioned that he himself possessed a small tensile testing machine. The Duke then made a tour of the Fair; and in the second block of buildings he was the recipient, from the British Aluminium Hollow-ware Manufacturers' Association, of a complete set of aluminium culinary utensils.

The members of the Birchcliffe (near Hebden Bridge) Y.M.C.A. paid a visit to the Hebden Bridge and Mytholmroyd Gas Board's works last week, and were conducted round by Mr. A. Whiteoak and his colleagues.

CALORIFIC POWER AT A GLANCE.



Alexander Wright
& CO., LTD.,
WESTMINSTER, S.W.1.
SOLE LICENSEES.

TRADE NOTES.

A Striking Calendar.

We have received a new calendar from Messrs. Newton, Chambers and Co., Ltd., Thorncliffe Iron Works, Sheffield. This is of no mean size and will certainly be of "far reaching" utility, as the figures are four and a half inches in height.

Scrubbing Plant.

A booklet which has just been issued by Messrs. Blair, Campbell, and McLean, Ltd., of Woodville Street, Govan, Glasgow, describes and illustrates some types of gas plant which they manufacture, but more especially their centrifugal scrubber. Their experience in the design and manufacture of chemical plant extends over a period of 85 years; and they possess a staff of qualified gas and chemical engineers prepared to consider any problem with which prospective customers may be confronted. A number of photographs are included of Blair centrifugal scrubbers (Maclaurin's patent) installed at gas and other works. Facts are quoted to show that in this scrubber the largest possible surface area of absorbent liquor is provided, turbulent flow of gas is assured, the time of contact is of considerable duration, and there is no possibility of gas slip. The Blair centrifugal scrubber is built in all sizes, from small experimental ones to large enough to pass 10 million c.ft. a day. Among the numerous other types of plant manufactured by the firm, a brief description is given of the salient features of their crude benzole recovery process.

Naphthalene Removal.

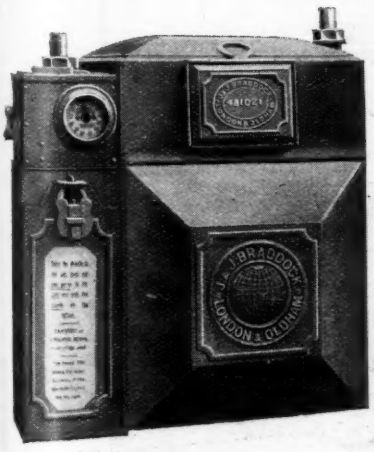
Undoubtedly the only way to eliminate naphthalene troubles with any certainty is to free the gas from the cause. The radical cure for naphthalene stoppages does not lie in spraying and vaporizing, for though these methods minimize them to some extent, they often give rise to a false sense of security. Messrs. W. C. Holmes & Co., Ltd., have prepared a booklet describing their "Special" rotary brush washers for the complete removal of naphthalene from gas. The plant is made in standard sizes from 50,000 c.ft. of gas per day. It is claimed that efficient service is obtained at very low cost (less than $\frac{1}{10}$th of a penny per 1000 c.ft.); the washer being positive in action, the gas must pass through the washing medium; that since there are no metal faces working together, there can be no "slip" of gas. The washing medium is a mineral or coal-tar oil, which should be fluid and free from naphthalene. The makers claim to have embodied in their new washer all the important features for successful working. The gas is washed in a true contra-current fashion, with a long sequence of operations to ensure that a supply of fresh oil is preserved in contact, which latter must be intimate and prolonged. The resistance to the passage of the gas is low; and finally the process is commercially sound. The booklet contains some interesting results which have been obtained at the Tynemouth Gas-Works, where washing in a Holmes rotary brush washer has been practised since 1921, with the result that naphthalene stoppages are a thing of the past.

Fatal Gas Explosion in Liverpool.—A regrettable gas explosion occurred in Liverpool on Tuesday, Feb. 13. A smell of gas had been detected at No. 37, Tynemouth Street; and this fact having been communicated to the Gas Company, an employee named Booth was sent to investigate the cause of leakage and remedy any defect which might be discovered. While carrying out his work, a serious explosion took place which demolished two houses, a considerable quantity of the débris of which was thrown into the street. Booth, who was killed, was the last to be extricated from the wreckage. Eight other persons were hurt, but fortunately not seriously injured.

Sheffield Gas Company.—The Directors report that the total quantity of gas sold during 1922 was 4,138,593,000 c.ft., being a decrease of 266,961,000 c.ft., or 6 p ct., on the previous year. This is a natural outcome of bad trade, from which Sheffield has suffered to a greater extent than any other city, with the result that the demand for gas for manufacturing purposes has been greatly reduced compared with previous years. Gas for domestic purposes continues to be popular, and there has been an increase on that side of the business. An interim dividend was paid for the half year ended June 30 equal to 5 p.ct. per annum; and after providing for the December six months at the same rate of dividend, there will remain a balance on the year's working of £12,441 to be added to the amount previously carried forward. During the past year the price of gas has been reduced from 10d. to 8d. per therm, which is equivalent to a reduction of 10d. per 1000 c.ft.; and a further decrease of 0·4d. per therm is to be made from the March quarter. The price will then be $7\frac{2}{3}$d. per therm, equal to 3s. 2d. per 1000 c.ft.

Merthyr Tydfil Gas Company.—At the fifty-fifth annual meeting of the Company, on the 21st inst., statutory dividends for the half year ended Dec. 31 were declared, at the rate of 5 p.ct. per annum on the preference stock, and at the rate of $6\frac{3}{4}$ p.ct. per annum on the consolidated ordinary stock, both less income-tax. The Chairman (Mr. Henry F. W. Harries), in his remarks, pointed out that three reductions had been made in the price of gas since December, 1921, and that the present charge was 10d. per therm, equivalent to 3s. 7d. per 1000 c.ft., or slightly over 30 p.ct. above the pre-war price. Considering that coal and wages were at present practically 100 p.ct. over pre-war costs, he thought it was a matter for congratulation by the consumers and stockholders that the Company had been able to reduce the price of gas so materially during the past year. It was the policy of the Board of Directors to give a good supply, and to sell gas at as low a price as possible, and so stimulate the demand for lighting, heating, cooking, and power purposes. The proceedings terminated with a vote of thanks to the Chairman and Directors, and to the General Manager (Mr. James E. Kenshole), Secretary, and staff.

BRADDOCK'S PATENT "SLOT" METERS.



No. 261. Dry "Slot" Meter.

THE BEST SLOTS MADE.

POSITIVE GEARING.

No. 265. Wet "Slot" Meter.

J. & J. BRADDOCK (BRANCH OF METERS LIMITED), **Globe Meter Works, OLDHAM.**

Telegrams—"BRADDOCK, OLDHAM." National Telephone No. 815.

AND 45 & 47, WESTMINSTER BRIDGE ROAD, LONDON, S.E. 1.

Telegrams—"METRIQUE, LAMB, LONDON." Telephone No. 2412 HOP.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Feb. 26.

The average values for gas-works products during last week were: Gas-works coal tar, 100s. to 105s. Pitch, East Coast, 160s. to 165s. f.o.b. West Coast—Manchester, 155s. to 160s.; Liverpool, 156s. to 161s.; Clyde, 160s. to 165s. Benzole 90 p.ct., North, 1s. 7½d. to 1s. 8d.; crude 65 p.ct. at 120° C., 1s. 0½d. to 1s. 1d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 8d. to 1s. 8½d. Toluole, naked, North, 1s. 11d. to 2s. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 10d. Heavy naphtha, North, 1s. 6d. to 1s. 8d. Creosote, in bulk, North, liquid, 8¼d. to 8¾d.; salty, 7½d. to 8d. Scotland, 7d. to 7½d. Heavy oils, in bulk, North, 7d. to 7½d. Carbolic acid, 60 p.ct., 3s. 6d. to 4s. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

The average price realized for the sale of tar in the Manchester district, according to the sliding-scale, for the month of January, was £4 18s. 1·67d. per ton.

FROM A MARKET CORRESPONDENT.

Bye-Products Trade.

The feature of the market during the past week has been continued strength in carbolic acid, particularly crystals, and in creosote. Both these products register substantial advances; the former being much wanted on export account. Pitch remains practically unchanged. South Wales patent-fuel makers are still in a difficulty; and the high prices they have been paying for pitch have led to short supplies of briquettes, which is hardly likely to be relieved for some time.

The range of quotations is as follows:

Benzole: 90% London 1s. 8d., North 1s. 7d. Pure 2s. 3d.

Crude Tar: 77s. 6d. to 80s. Refined, 40s. per barrel (free) on rail.

Pitch: London, 135s. to 140s. per ton; East Coast, 145s. per ton; West Coast, 120s. to 127s. 6d., with Manchester 127s. 6d. per ton, and Glasgow 125s. per ton; South Wales, 132s. 6d. to 135s. per ton.

Solvent Naphtha: London, 1s. 7d. Provinces average 1s. 6d. per gallon.

Crude Naphtha: Naked, 9d. per gallon.

Heavy Naphtha: 1s. 7d. per gallon.

Naphthalene: Refined, £15; inferior, £13; crude, £4 to £7 10s., according to quality.

Toluole: Naked, 2s. North, 1s. 11d.

Creosote: London, 8½d. to 8¾d.; North, 7¾d. to 8d.

Anthracene: 40-45%, 4d. per unit per cwt.

Pyridine: 12s. per gallon.

Aniline Oil: 11d. per lb., drums extra.

Aniline Salts: 10d. per lb.

Cresylic Acid: 95%, 2s. 8d. to 2s. 9d.; 97-99%, 2s. 9d. to 2s. 10d per gallon *ex* works London, f.o.b. other ports.

Carbolic Acid: Crude 60%, 2s. 7d. per gallon; crystals 40%, 1s. 2d. per lb.

Salicylic Acid: Technical, 1s.; B.P., 1s. 6d. per lb.

Xylol: Pure, 2s. 9d.; commercial, 2s. per gallon.

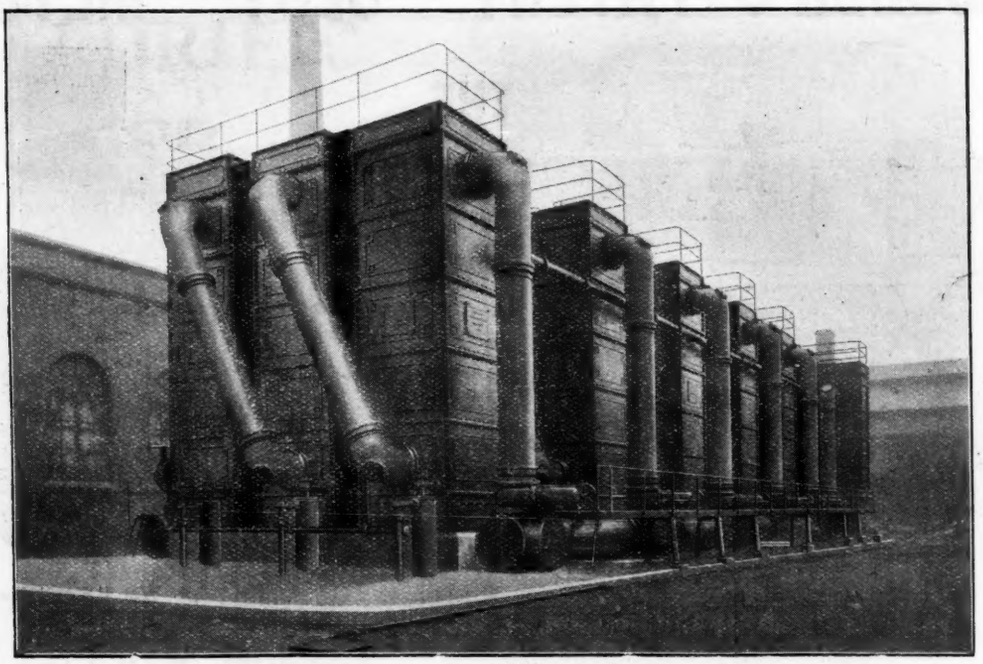
Sulphate of Ammonia.

Home trade in sulphate of ammonia is rather slow at £16 18s. per ton for neutral 25⅝ p.ct. quality, and £15 15s. for ordinary 25¼ p.ct. quality. Export trade is much more promising, with quotations on the upward grade.

Theft of Gas at Birmingham.—At the Birmingham Police Court on Friday, Henry George Potter, of Park Lane, Aston, and his wife, Annie Sarah Potter, were summoned for stealing gas, the property of the Birmingham Corporation. An inspection of the gas-meter showed that an indiarubber tube had been connected between the main gas-pipe and the pipe serving the house, the gas not passing through the meter. There were two previous convictions for similar offences against the man. The Chairman (Sir John Barnsley) said the summons against Mrs. Potter would be dismissed, and the male prisoner would be committed to prison for one month. It was a serious offence, he added. Fortunately, in Birmingham, there were not many cases of the kind, because the citizens were very loyal to their responsibilities.

Ilfracombe Gas Company.—The Directors are pleased to report that the business of the Company continues to progress, notwithstanding the difficulties it has to encounter as a unit of the British gas industry. The profit and loss account for the year ended Dec. 31 shows an available balance of £2230, after paying an interim dividend of 2½ p.ct. on the preference stock and 2½ p.ct. on the consolidated ordinary stock. The Directors recommend a further payment of 2½ p.ct. on the preference stock and 3 p.ct on the consolidated ordinary stock. The aim expressed in the report of 1922, to effect as early as possible a reduction in the price of gas, was achieved; the price per therm for the quarter ended Christmas, 1922, having been 16d. The successful policy of the Managing-Director (Mr. J. Armstrong) in buying coal and other raw materials in the cheapest and best markets, has enabled a further reduction of 1d. per therm to be made as from the last mentioned quarter; the present price being 15d. per therm. Under the powers of the Company's Act of 1915, the Directors have allocated a sum of £434 to the creation of a special purposes fund, which shall be applicable to meet such charges as an accountant appointed for the purpose by the Board of Trade shall approve.

LATEST IMPROVEMENTS—"BEARSCOT" TUBES—MADE IN ALL SIZES.



DEMPSTERS' WATER COOLED CONDENSERS.
CAPACITY "20 MILLION" CUBIC FEET OF GAS PER DAY.

R. & J. DEMPSTER, LTD., MANCHESTER.
LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W.1.

STOCK MARKET REPORT.

In the Stock Exchange last week the prevailing tone was encouraging in the earlier portion of the time, and prices advanced in many lines; but later came realization of profits, and some of the gains were lost. Home Government closed better; the big four marking thus: Consols 57⅜-57⅝, War Loan 100$\frac{15}{16}$-101⅛, Funding 88⅛-88$\frac{13}{16}$, Victory 89$\frac{5}{16}$-89$\frac{7}{16}$. Home Rails were wanted, and the Foreign Market was brighter.

The Gas Market was quite active, and business was fairly distributed. A vast number of quotations were varied owing to *ex div.* adjustments, and nearly all gained as a result. They are too numerous to particularize here; but all are shown in the table of prices, and they indicate clearly the firmness of the market.

The following transactions in gas during the week were recorded: On Monday, Bournemouth 6 p.ct. preference 9$\frac{3}{16}$, Brentford "A" 98, British 7 p.ct. preference 12$\frac{5}{8}$, 12$\frac{3}{4}$, Commercial 3 p.ct. debenture 57⅛, Croydon maximum dividend 83⅛, 84, European 7$\frac{3}{4}$, Gas Light ordinary 92$\frac{1}{4}$, 92$\frac{3}{8}$, 92$\frac{1}{2}$, 92$\frac{3}{4}$, 92$\frac{7}{8}$, 93, ditto 3½ p.ct. maximum 63$\frac{1}{8}$, 64$\frac{1}{8}$, ditto 4 p.ct. preference 78$\frac{3}{8}$, ditto 3 p.ct. debenture 61, 61¼, 61$\frac{3}{4}$, Hastings and St. Leonards 3½ p.ct. 78, Imperial Continental 151, Liverpool 7 p.ct. preference 108$\frac{5}{16}$, Primitiva 5 p.ct. preference 48s. 9d., South Metropolitan 95$\frac{1}{2}$, 95$\frac{5}{8}$, 95$\frac{3}{4}$, 96, South Suburban 100, Swansea 7 p.ct. preference 104$\frac{3}{4}$, Tottenham 6 p.ct. debenture 100$\frac{1}{2}$. On Tuesday, Alliance and Dublin 59, 60$\frac{1}{4}$, Bournemouth 5 p.ct. 11½, ditto 6 p.ct. preference 9$\frac{5}{32}$, Brighton and Hove original 167$\frac{1}{2}$, ditto "A" 124, European 7$\frac{3}{4}$, 7$\frac{15}{16}$, Gas Light ordinary 92$\frac{1}{4}$, 92$\frac{3}{8}$, 92$\frac{1}{2}$, 93, ditto 4 p.ct. preference 78$\frac{1}{2}$, 78$\frac{3}{4}$, 79, ditto 3 p.ct. debenture 61¼, Imperial Continental 151, 153, Newcastle 3½ p.ct. debenture 68$\frac{1}{2}$, Primitiva 5 p.ct. preference 48s., 48s. 3d., 49s., 49s. 1½d., South Metropolitan 95$\frac{1}{2}$, 96, Swansea 7 p.ct. preference 104$\frac{1}{2}$, Sheffield "B" 97, ditto "C" 96$\frac{3}{4}$, Danish 5$\frac{1}{16}$, ditto 4 p.ct. debenture 72. On Wednesday, Brentford 4 p.ct. debenture 76½, Brighton and Hove original 168, ditto "A" 123, British 41, Commercial 3 p.ct. debenture 58, 58½, Continental Union 23, European 7$\frac{1}{2}$, Gas Light ordinary 92½, 92$\frac{3}{4}$, 93, 93¼, 93$\frac{3}{8}$, 93½, ditto 3½ p.ct. maximum 63$\frac{3}{4}$, ditto 4 p.ct. preference 79, 79½, ditto 3 p.ct. debenture 60½, Imperial Continental 152½, Primitiva 138., ditto 5 p.ct. preference 48s. 3d., South Metropolitan 93$\frac{3}{4}$, 95$\frac{3}{8}$, 96$\frac{1}{8}$, ditto 3 p.ct. debenture 61, Tottenham "B" 101, 101½, Danish 4 p.ct. debenture 73, 74. On Thursday, Bournemouth 6 p.ct. preference 9$\frac{3}{8}$, Brighton and Hove original 165½, European 7$\frac{15}{16}$, Gas Light ordinary 92$\frac{3}{8}$, 93, 93$\frac{1}{8}$, 93¼, 93$\frac{3}{8}$, 93$\frac{5}{8}$, ditto 3½ p.ct. maximum 63½, 64¼, 64½, 64$\frac{3}{4}$, Imperial Continental 152$\frac{1}{2}$, San Paulo 5 p.ct. debenture 37, South Metropolitan 93½, 93$\frac{3}{4}$, 94, South Suburban 98$\frac{1}{2}$, Wandsworth Wimbledon 99, Barnet "A" 130, ditto "C" 130, ditto "D" 112, ditto 4 p.ct. debenture 75. On Friday, Bombay 97s. 6d., Bournemouth 6 p.ct. preference 9$\frac{3}{8}$, Brentford "A" 95, British 39, Continental Union 23, European 7$\frac{3}{4}$, Gas Light ordinary 92$\frac{1}{2}$, 92$\frac{3}{4}$, 93$\frac{3}{8}$, 93$\frac{1}{2}$, 93$\frac{5}{8}$, ditto 4 p.ct. preference 78$\frac{3}{4}$, 80, ditto 3 p.ct. debenture 60$\frac{1}{2}$, Imperial Continental 153, 154, 155, 157, Primitiva 5 p.ct. preference 48s., South Metropolitan 93$\frac{1}{2}$, 94$\frac{1}{2}$, ditto 3 p.ct. debenture 61, Swansea 7 p.ct. preference 104$\frac{3}{4}$, Barnet "A" 134$\frac{1}{2}$, ditto "C" 134$\frac{1}{2}$.

In the Money Market, firmness was the feature, there being a good demand all through the week; and discount rates were of a like character up to the close. Silver, supported by Eastern requirements, was firm at 31d. The Bank of England rate was 3 p.ct., as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
131,978	Stk.	Feb. 22	—	5%	Aldershot 5 p.c. max. C.	..	74—79*	...
190,492	,,	,,	4	4%	Do. 4 p.c. Pref. .	..	66—71*	...
1,551,868	,,	Oct. 5	2½	5%	Alliance & Dublin Ord.	59—64	59—64	59—60⅞
374,000	,,	Jan. 11	4	4%	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	Oct. 19	7½	4/-	Bombay, Ltd. . . .	5¼—6¼	4¼—5	97/6
100,000	5	Feb. 22	16	8/-	Bournemouth Gas and Water { 5 p.c. . . B 7 p.c. . Pref. 6 p.c. 4 p.c. Deb.	.. 15—15½ 13¼—14 ..	11—12* 11—12* 9—10* 71—76	11¼—11⅝ ... 9⅛—9⅞ ...
383,110	10	,,	7	7/-				
115,000	10	,,	6	6/-				
162,065	—	Dec. 29	—	4%				
992,045	Stk.	Feb. 22	14	6¼/-	Brentford A Consolid. .	261—266	93—95*	95—98
734,920	,,	,,	11	6¼/3	Do. B New . .	204—209	93—98*	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref. .	109—111	85—92*	..
221,400	,,	Dec. 14	4	4%	Do. 4 p.c. Deb. .	91—93	75—80	76½
214,775	,,	Aug. 24	11	11½%	Brighton & Hove Orig. .	208—213	165—170	165½—168
244,200	,,	,,	8	8½%	Do. A Ord. Stk.	154—159	120—124	123—124
1,272,500	Stk.	Feb. 22	5	5%	Bristol 5 p.c. max. . .	..	92—94*	...
570,000	20	Oct. 5	12½	22/6	British	44—45	38—43	39—41
10,000	10	Dec. 29	—	7/-	Do. 7 p.c. Pref. . .	..	11—13	12½—12⅝
120,000	Stk.	June 29	4	4%	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
210,335	,,	Dec. 29	4	4%	Buenos Aires 4 p.c. Deb.	85—87	53—58	...
100,000	10	Nov. 2	—	—	Cape Town & Dis., Ltd.	1½—2½	6¾—7¼	...
100,000	10	Oct. 19	—	—	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	Dec. 29	4½	—	Do. 4½ p.c. Deb. Stk.	70—75	71—76	...
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb. . .	..	102—104	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord. . .	108—110	..	...
1,513,280	,,	July 27	5/9/4	56/-	Commercial 4 p.c. Stk.	106—108	95—98	...
560,000	,,	,,	5½	55/-	Do. 3½ p.c. do.	103—105	95—98	...
475,000	,,	Dec. 14	3	3%	Do. 3 p.c. Deb. Stk.	69¼—71½	55—60	57½—58½
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	19—24	23
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	115—118	55—60	...
660,000		Sept. 1	—	6%	Croydon sliding scale. .	..	97—102	...
284,975		,,	—	5%	Do. max. div. . . .	..	81—86	83½—84
492,270	Stk.	—	6	4½%	Derby Con. Stk. . .	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk. .	102—104	..	...
209,000	,,	Oct. 5	—	5%	East Hull 5 p.c. max. .	..	..	...
1,002,180	10	Jan. 25	10	5/0	European, Ltd. . . .	17½—18	7½—8½	7½—7⅝
16,546,120	Stk.	Feb. 8	4/17/4	52/-	Gas Light and Coke { 4 p.c. Ord . . . 3½ p.c. max. . 4 p.c. Con. Pref. 3 p.c. Con. Deb. 10 p.c. Bonds . 7½ p.c. Ilford Deb	98—102	92—94	92½—93⅜
2,600,000	,,	,,	3½	35/-		76—79	63—65	63½—64⅜
4,062,235	,,	,,	4	4%		96—99	77—80	76½—80
4,761,930	,,	Dec. 14	3	3%		72½—74½	59—62	60½—61⅝
130,000	,,	Dec. 11	10	10%		..	..	...
	—	—	—	—		..	..	...
82,500	,,	Sept. 21	5	65/7½	Hastings & St. L. 5 p.c.	..	95—100	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	77—80	78
70,000	10	May 18	11	7½%	Hongkong & China, Ltd.	16½—16¾	6—7	...
86,600	Stk.	Aug. 24	9	9½%	Hornsey 7 p.c. . . .	..	130—135	...
1,976,000	,,	Nov. 16	9	£5	Imperial Continental .	150—160	153—158	151—157
404,800	,,	Feb. 8	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	75—78	..
235,242	,,	July 27	6¼	6¼%	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord. . .	..	..	...
600,000	,,	Sept. 21	—	7%	,, 7 p.c. Pref. .	..	105—107	108
165,736	,,	Feb. 22	7/5/6	80/-	Maidstone 5 p.c. . .	..	84—89*	...
63,480	,,	Dec. 29	—	3%	Do. 3 p.c. Deb . .	..	53—58	...
75,000	5	June 29	6	6%	Malta & Mediterranean	4¼—4¾	3¼—3¾	...
100,000	100	Oct. 2	4½	4½%	Met. of Melbourne 4½ p.c. Deb.	99—101	97—100	...
341,920	Stk.	Nov. 30	4	4%	Monte Video, Ltd. . .	11½—12	50—55	...
1,875,892	,,	Feb. 22	4½	4½%	Newcastle & Gatsh'dCon.	98½—99½	81—82*	...
250,166	,,	,,	—	4%	Do. 4 p.c. Pref. Stk.	..	77—77½*	...
529,705	,,	Dec. 29	3½	3½%	Do. 3½ p.c. Deb.	82—83	68—69	68½
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	..	...
55,940	10	Aug. 24	7/14/0	7/8⅞	,, ,, 7 p.c.	14—15	10½—11½	...
300,000	Stk.	Nov. 30	8	8%	Oriental, Ltd. . . .	117—122	95—100	...
188,120	Stk.	Dec. 29	—	72/6	Plym'th & Stonh'se 5 p.c.	..	94—99	...
60,000	50	Aug. 24	13	65/-	Portsea Island, B . .	128—131	100—105	...
100,000	50	,,	12	60/-	Do. C . .	118—121	97—102	...
290,059	5	—	8	—	Primitiva Ord. . . .	5¼—6	⅛—¼	13/-
499,960	5	—	5	—	Do. 5 p.c. Pref. .	4¾—5	2¼—2½	48/—49/1½
321,600	100	Nov. 30	4	4%	Do. 4 p.c. Deb. .	91—93	68—73	...
600,000	Stk.	Jan. 25	4	4%	Do. ,, ,, 1911	..	55—60	...
346,198	,,	Dec. 29	4	4%	River Plate 4 p.c. Deb.	85—87	53—58	...
150,000	10	Sept. 21	6	6/-	San Paulo { 6 p.c. Pref. 5 p.c. Deb.	10¼—11 47—49	5¾—6¼ 36—38	... 37
125,000	50	July 3	5	5%				
135,000	Stk.	Aug. 24	10	5%	Sheffield A	223—224	97—99	...
209,984	,,	,,	10	5%	Do. B	222—224	97—99	97
525,500	,,	,,	10	5%	Do. C	220—222	96—98	96¼
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c. . .	..	..	...
90,000	10	Nov. 2	9	7%	South African . . .	10¼—11¼	7—9	...
6,609,895	Stk.	Feb. 22	5/4/0	60/-	South Met. Ord. . . .	111—113	93—95*	93¼—96¼
250,000	,,	Jan. 11	—	5%	Do. Red. Pref. .	..	95—97	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb. .	72¼—74¼	59—62	61
734,000	,,	Sept. 7	—	6¼%	Do. 6½ p.c. Deb.	..	105—107	...
91,500	,,	Feb. 22	8½	8½%	South Shields Con. Stk.	157—159	115—117*	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	97—100*	98¾—100
368,837	,,	Dec. 29	5	5%	Do. 5 p.c. Deb. Stk.	116—118	93—98	...
647,740	,,	Nov. 2	5	7%	Southampton Ord. . .	99—102	80—83	...
121,275	,,	Dec. 29	4	4%	Do. 4 p.c. Deb. Stk.	..	68—73	...
250,000	,,	Aug. 24	—	218	Swansea 7 p.c. Pref. Stk.	..	103—105	104¾
200,000	,,	Dec. 29	—	202	Do. 6½ p.c. Deb. Stk.	..	101—103	...
120,000	,,	Feb. 22	—	7½%	Tottenham and District { A 5 p.c. . B 3½ p.c. . 4 p.c. Deb.	135—138 115—117 87—89	109—114* 95—101* 75—80	... 101—101½ ...
782,275	,,	,,	6	6%				
181,253	,,	Dec. 14	4	4%				
258,251	Stk.	Aug. 24	3	2½%	Tynemouth 5 p.c. max.	108½—109	80—81	82
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 22	8½	87/6	Wandsworth A 5 p.c. .	151—156	108—112*	...
255,636	,,	,,	6¼	72/6	Do. B 3½ p.c. .	129—134	98—103*	...
108,175	,,	,,	—	61/3	Do. C. . . .	..	86—91*	...
140,865	,,	,,	—	61/3	New Ordinary . . .	..	86—91*	...
352,000	,,	,,	6¼	68/9	Wimbledon 5 p.c. . .	117—122	93—98*	99
98,000	,,	,,	6¼	73/9	Epsom 5 p.c. . . .	121—126	98—103*	...
88,416	,,	Dec. 29	3	3%	3 p.c Deb. Stk. .	66—69	56—59	...

* Ex Div.

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THE FLOW OF GASES and PROPORTIONING GAS MAINS.

By

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Gas Price Reductions in Ireland.—The Alliance and Dublin Consumers' Gas Company announce a further reduction in the price of gas by 2d. per therm (or 9d. per 1000 c.ft.), to take effect as from the date of the readings for the March quarter. The Belfast Corporation Finance Committee have recommended a reduction in the price of gas by 4d. per 1000 c.ft., making the net price 2s. 6d. Gas in Cavan has been reduced by 5d. per 1000 c.ft.

Smethwick Storage Scheme.—At a special meeting of the Smethwick Town Council, it was decided to promote a Bill in the present session of Parliament to acquire by compulsion or agreement a piece of land at the corner of Foundry Lane and Rabone Lane, for the purpose of erecting thereon a gasholder. It was stated that the saving between the present scheme and one the Committee had in prospect before the war would be something like £30,000.

The Fatal Accident at the Toronto Gas-Works.—Inquiry into the fatal accident at the works of the Toronto Gas Consumers' Company, by which ten employees lost their lives, has shown that the gas escape which asphyxiated them was caused by failure to close a valve-outlet before the alterations to the plant were begun. The Coroner's Jury commended the heroic conduct of the half-dozen employees who lost their lives in the endeavour to rescue their comrades.

Split Gas-Pendant Fatality.—A split gas fitting (not one of those supplied by the Gas Company) was found to have been the cause of the death at Brighton of Mary Planner, who was 86 years of age. She was found in a sitting position on the floor; there being a smell of gas in the room. Deceased had stated that her heart was weak. Mr. Harold Paul, Senior Inspector of the Brighton and Hove General Gas Company, said he was sent to examine the fittings, and in the kitchen, where deceased was found, he discovered a very old pendant with a split in it 2 in. long. When the gas was turned on, there was an escape; and with the windows shut, it would accumulate.

Sunderland Gas Company.—The report of the Directors for last year states that an interim dividend was paid in September, and they now recommend the declaration of a like dividend of 3 p.ct. on the ordinary stock (less income-tax). The price of gas was reduced on three occasions during the year, making a total reduction of 1s. per 1000 c.ft. The Directors accepted with much regret the resignation of Mr. S. P. Austin, who has rendered valuable service as a member of the Board over a period of 37 years, and report that Mr. T. S. Short has been elected to fill the vacancy. They record with regret the death of both Auditors—Mr. C. O. Nicholson and Mr. H. S. Squance.

British Empire Exhibition (1924).—There has been prepared by the Incorporated British Engineers' Association a first list of exhibitors in the shipbuilding, marine, mechanical, and general engineering section which is being organized by the Association in connection with the British Empire Exhibition to be held from April to October of next year at Wembley Park. The booklet, which is obtainable at the offices of the Association, No. 32, Victoria Street, S.W., also contains information for inquirers. It is evident that, in spite of all the distractions of public controversy about the exhibition, very satisfactory progress has already been made with the organization of the Engineering Section, which promises to be one of its most important and impressive features.

Matlock and District Gas Company.—The report presented by the Directors at the recent annual meeting stated that on revenue account there was a profit of £6942, to which had to be added the unappropriated balance from the previous year, making altogether £11,229. Against this had to be charged the interim dividend and debenture interest, leaving for disposal £9863. They recommended that this sum be applied in the following manner: In writing-off the cost of the promotion of the Special Act, £3603; payment of a dividend for the half year to Dec. 31 at the rate of 7s. 9d. per share on the paid-up capital (making 6⅝ p.ct. for the year), less tax. The total expenditure was £24,051; the income £30,993. The report was adopted.

Primitiva Gas Company of Buenos Aires, Ltd.—A circular has been addressed to the shareholders, in which it is stated that the Chairman has arranged to sail for Buenos Aires on March 9, and will look closely into the affairs of the Company. On his return at the end of June, the annual general meeting will be held, when the latest information will be available. The principal figures of the year's working to Dec. 31 last have been received by cablegram; and the approximate results are as follows: The balance of revenue account for 1922 and the interest received from the purchasers of the electric section amount to £83,015; receipts from other sources, £315; total, £83,330. Deducting debenture interest (£59,689) and other expenses, there is a profit on the year's working of £3837. Deducting this from the balance of profit and loss account at Dec. 31, 1921 (£461,709), there remains a debit to profit and loss at Dec. 31, 1922, of £457,871.

Faulty Gas-Fittings.—At Pontefract, a man named Joynes and his wife were found dead in bed. The wall gas-bracket was split the whole length, and stuffed up with newspapers and soap. Gas going through the meter at 30 c.ft. per hour caused the discovery that the kitchen pendant was also leaking at the ball-joint, and was smeared with soap. The Jury returned a verdict of "Death from misadventure;" and the Coroner made some comments on the deplorable condition of the gas-fittings.

A Burst Main at Leeds.—A family of six, named Waddington, living at Easy Grove, Leeds, were subjected to gas poisoning in the early hours of the morning on the 23rd inst., the gas escape being due to the bursting of a 2-in. main in the street. The gas department attributed the burst to the sudden thaw after snow and frost. The family were awakened and saved as the result of a child crying, and were taken to the infirmary. It is not explained how the gas got into the house, seeing that all the windows and the cellar grating were tightly closed.

Gas Supply of Knaresborough.—The proposal of the Knaresborough District Council Gas Committee to apply for power to borrow £20,000 to bring the gas-works up to date—which was temporarily defeated recently in the Council by a narrow majority—is arousing opposition in the town. The local branch of the National Citizens' Union last week passed resolutions protesting against the proposal, and favouring negotiations with the Harrogate Gas Company for the future supply of gas. The meeting decided also to be represented at the Ministry of Health inquiry, in order to contend that the Harrogate Gas Company can give a cheaper and better service.

Gas Engineer's Steps to Obviate Trouble.—In a report submitted by the Gas Committee to the Stoke-on-Trent Town Council, it was stated that, on consideration of the circumstances attending the gas explosion in Anchor Road, Longton, in December last, the Gas Engineer (Mr. A. Mackay) had come to the conclusion that it was advisable to make an examination with a view to ascertaining the extent of colliery workings under the Longton Gas-Works. The Committee decided that the Engineer be requested to confer with the Town Clerk on this matter, and that, if it appeared to be necessary, he should be authorized to make the inspection that had been suggested by him.

Westminster City Council and Carbon Monoxide.—The General Purposes Committee of the Westminster City Council have reported the receipt of a letter to the Mayor from the Gas Light and Coke Company giving, in view of the recent Press agitation on the subject of carbon monoxide poisoning, facts respecting the gas supplied by them, together with a copy of a pronouncement by the "Lancet," which, the Company stated, should do much to allay unfounded apprehension. The "Lancet" considered that, however much the occasional cases of accidental gas poisoning might be regretted, it was difficult to see how they could be avoided by prescribing gas composition.

Kettering Gas Company.—A very satisfactory report was submitted at the half-yearly meeting of the Company, presided over by Mr. T. Bird, J.P. (Chairman). The Directors recommended the payment of dividends at the rate of 10 p.ct. per annum on the "A" stock, 7 p.ct. on the "B" stock, and 5 p.ct. on the "C" stock, less income-tax. The Chairman said that during last year they reduced the price of gas by 3d. per 1000 c.ft. in the second quarter, and in the last six months it was reduced 6d. This had made a difference to them of something like £3600. However, they still had a very satisfactory report, and were holding their own in the sale of gas. The report and balance-sheet having been adopted, the recommendation as to dividend was approved by the meeting.

Hartlepool Gas and Water Company.—Mr. Stanley Appleby, J.P., presided at the annual meeting of the Hartlepool Gas and Water Company on Thursday, Feb. 22. He said, moving the adoption of the report and balance-sheet, that the amounts earned by the joint undertakings enabled the Directors to recommend the full statutory dividend of 5 p.ct. per annum. He hoped the year just completed would prove the turning-point to better and more normal conditions. The working costs of the gas undertaking had been reduced by over 20 p.ct., which enabled the Company to bring down the price of gas by 1s. per 1000 c.ft. in June last, and a further 4d. last December. It would be noticed from the report that, with the introduction of the therm basis next month, the Company proposed to make a further reduction of 2d. per 1000 c.ft. to slot-meter consumers. These reductions represented a total saving to the consumers of over £24,000 per annum. Sir Frank Brown, who seconded the adoption of the report and balance-sheet, observed that twelve months ago, instead of getting the statutory dividend of 2½ p.ct., they were only able to recommend 1 p.ct., which meant a deficiency of £8500 in net cash to the stockholders.

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